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PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*

A vowel is *long* when standing alone or in a syllable which ends in silent *e* or when ending an accented syllable

S is always soft, and never has the sound of *z*

The foreign sounds which have no equivalent in the English language are represented as follows:

K for the German *ch*, as in Bach: (Bach, *baK*).

N for the French *n*, as in Breton (Breton, *bre toN'*).

o for the German *o*, as in Gottingen (Gottingen, *gō'ting en*).

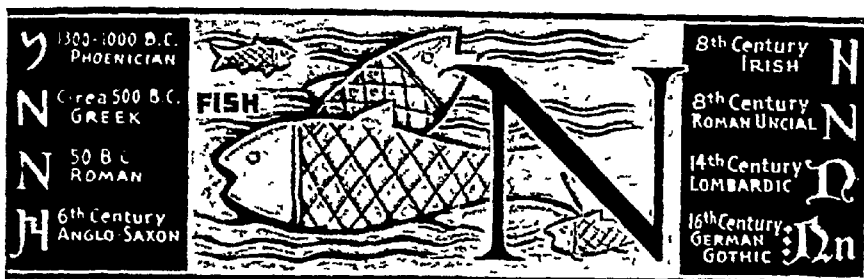
u for the German *u*, as in Blücher (Blücher, *bluK'ur*).

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N, the fourteenth letter of the English alphabet, in its form derived, with practically no change, from the Phoenician alphabet. Its value, also, has been the same from the earliest time. In English and most other languages, *n* has a pure nasal sound, and it is much the commonest of the nasals. In a few words, after *m* and *l*, it is silent, as in *hymn*, *liln*, and in many words it has, in unaccented syllables, the force of a vowel, as in open, chosen. Before *g*, *l*, *ch* it receives a semiguttural or palatal coloring to harmonize with the consonant it precedes, as in *long*, *ink*, *punch*.

The commonest use of *n* as an abbreviation is for *north*.

NA'BOB, or **NA'BAB**, in India, under the Mogul Empire, the governor of a province comprised in the region ruled by a viceroy. The title was continued under the British rule, but gradually was applied to unofficial wealthy natives. In Europe it is applied to those who have amassed fortunes and make ostentatious display of their wealth.

NABOPOLASSAR, *nab o po las' ahr*, a famous king of Babylonia, who probably fought his way to the throne through conquest, for in inscriptions thus far unearthed he is not referred to as descended from royalty. His reign began in 625 B. C. and continued to 605 B. C., when his son Nebuchadnezzar inherited the empire. Nabopolassar came into added power through conquest of a district of Chaldea, south of Babylonia; several times he attempted to gain Assyria, and succeeded in this design a year before his death, by the capture and destruction of Nineveh.

NACOGDOCHES, *nah o do'chez*, a city and county seat of Nacogdoches County, Texas, 138 miles north by east from Houston. It owes its origin to a Spanish mission, estab-

lished in 1716. During the controversy between Spain and the United States over Spanish possessions in the southwest it was captured in 1812 by an American force. It is the commercial center of a productive cotton-growing, and is the seat of Stephen F. Austin State Teachers' College and a branch of the State Agricultural Experiment Station. Population, 1930, 5,687.

NADIR. Imagine an imaginary straight line passing from the zenith through the center of the earth and beyond. Any astronomical point upon this line on the side of the earth opposite the zenith is the nadir. The zenith and the nadir are the poles of the horizon.

NAGASAKI, *nah ga sah'ke* JAPAN, one of the principal Japanese seaports, and capital of the prefecture of the same name, on the northwest coast of the island of Kyushu. It is beautifully situated on a peninsula and enclosed by hills, upon the sides of which a portion of the town is built. The harbor, which is three miles in length, is excellent, and the trade is very large. Its commercial importance had its beginning in the sixteenth century, when it became the center of Japanese Christians and an important port in the foreign trade of Japan. For many years it was the only Japanese port open to Europe. Nagasaki was one of the five Japanese ports opened in 1858 to the British and Americans, and eleven years later it was opened to foreign nations generally. The chief exports are copper, silk, camphor, tobacco, porcelain, lacquered wares and sugar. Population, 1930, 204,626.

NAGOYA, JAPAN, a prosperous industrial city, capital of the province of Owari, on the island of Honshu, 235 miles west-southwest of Tokyo, and on the Bay of Owari. The city is well built, and contains many

temples and monasteries, and a castle Nagoya is one of the greatest centers of the pottery trade in Japan, and the industry gives employment to many of the inhabitants. In the vicinity of the city is the industrial settlement of Sedo, where the first glazed pottery in Japan was produced in the thirteenth century, and where the first work in cloisonné enameling in the country was done in the nineteenth century. The city also contains cotton, silk and embroidery establishments. Population, 1930, 907,404.

NAHANT, MASSACHUSETTS, a town in Essex County, on a peninsula extending into Massachusetts Bay. It derives interest, not from its size, but from its picturesque and historic associations. Its site is said to have been one of the landing places of the Northmen. It was visited in 1614 by Capt. John Smith. Nahant has been for years a favorite summer resort for Boston people, and has many beautiful homes, among them that of the late Senator Henry Cabot Lodge. Population, 1930, 1,654.

NAIADS, *na'yaḏz*, in Greek mythology, nymphs of fountains and brooks, of similar character to the dryads and resembling the nixies of northern mythology.

NAILS, of animals, are a form of the outer layer of the skin. In man the nails do not enclose the ends of the fingers and toes, but in the horse and other animals the nails assume the form of protective coverings and are then known as "hoofs." Nails may be produced to form "claws," as in birds and flesh-eating animals, while in the sloths they are large enough to aid in climbing trees. The human nail consists of a root, which is hidden below the skin, and an exposed part, which is attached to the skin. Both are produced from the true skin. They grow in length about one-thirtieth of an inch in a week on the fingers and more slowly on the toes. If a nail be removed by accident, it will grow again, provided the cells which secreted it have not been injured. The light spot at the base of the nail is called the *lunula*.

NAILS, small, slender pieces of metal, generally with round or flattened heads, used for driving into timber or other material for the purpose of holding separate pieces together. There are numerous kinds and sizes, and these are all made by machinery. There are many patterns of nail-making machines, and the process of manufacture

has been so cheapened that the price of nails is much less than formerly. *Cut nails* are made by rolling the iron into flat bars, which are a little wider than the nail is long, and of the same thickness. These bars, called *nail plates*, are fed into a machine, which cuts the nail, then seizes it in a vise-like arrangement and strikes it a sharp blow with a die, which forms the head. By an ingenious device, the plate is usually fed into the machine so as to have the wide part of the nail cut from the two edges alternately; in this way waste of iron is prevented.

Wire nails are now in use for most purposes. They are made from steel wire which is prepared especially for the purpose. The wire is wound on a reel, one end of it is fed into a nail machine, which cuts the nail, points it and makes the head automatically. A single machine will make from 150 to 500 nails a minute, depending on the size, the large nails requiring more time than the small ones. Nearly a million tons of wire are made into nails in the United States each year.

The size of the nails is denoted by the term *penny*, as, six-penny and eight-penny. The word *penny* in this sense means *pound*, and the term indicates the number of pounds that a thousand nails of that size will weigh, as, one thousand six-penny nails will weigh six pounds. Very large nails are called *spikes*, and very small ones, *brads* or *tacks*, according to the shape.

The great importance of nail-making as an industry is shown by the statistics of production and export for a recent five-year period. The average annual production in the United States for this period was over 883,000 tons wire nails, and 41,000 tons cut nails. In this same period there were exported annually 55,000 tons wire nails and 3,000 tons cut nails.

NAIROBI, *ni'ro'be*, the capital and headquarters of administration of Kenya Colony and Protectorate, a colony in British East Africa, on the Indian Ocean, 327 miles by rail northwest of Mombasa. It lies on a plateau, about 5,500 feet above sea level. It has extensive railroad yards, government and church schools, hotels, stores, athletic grounds, and numerous public buildings. It is visited annually by large numbers of sportsmen from all parts of the world, attracted by the big-game shooting for which the colony is famous. Population, 70,000.

NAMES, PERSONAL It is probable that in early times each name had some personal significance. Most Old Testament names are original, that is, they were given in the first instance to the individuals bearing them. They either originated in some circumstance of birth or expressed some religious sentiment, thus Jacob (supplanter), Isaiah (salvation of Jehovah), Hannah (favor), Deborah (bee). When some important change occurred in a man's life, his name was often changed to fit his new circumstances or disposition. Thus Abram became Abraham, and Jacob became Israel.

The Hebrews, Egyptians, Assyrians, Babylonians, Persians and Greeks had no surnames, and in the earliest period of their history the same may be said of the Romans. In course of time, however, every Roman citizen had three names, the *praenomen*, or personal name, the *nomen*, or name of the gens or clan, and the *cognomen*, or family name, as Publius Cornelius Scipio. Conquerors were occasionally complimented by the addition of a fourth name, or *agnomen*, commemorative of their conquests, as Publius Cornelius Scipio *Africanus*. Greek names often referred to some personal characteristic, to some special favoritism on the part of the gods or to some future momentous event; while Roman names referred often to the personal appearance and were frequently supplemented by the occupation, place of birth or a nickname. Times of public excitement have had considerable influence in modifying the fashion in names.

It is impossible to state with any degree of certainty when the modern system of personal nomenclature became general. Surnames were introduced by the Norman adventurers, but were for centuries confined to the upper classes. They became general in Scotland about the twelfth century. In some of the wilder districts of Wales they can hardly be said to have been adopted even yet. The principal sources of surnames have been words denoting personal characteristics (Black, Long, Short), rank, profession or occupation (Bishop, Knight, Miller), localities or natural objects (Hill, Dale, Stone), and patronymics (Johnson, Wilson, Andrews). The Scotch *Mac*, the Irish *O'*, the Norman *Fitz*, the German *-sohn*, the Scandinavian *-sen*, and the Russian *-vitch* have the same signification as the English *-son*. The Hebrews had no surnames proper, but to dis-

tinguish two men of the same name they used the form Solomon ben David (Solomon, son of David). The Welsh use the word *ap* in the same way—Evan ap Richard (John, son of Richard). In France *de* was used in a similar way, as in *d'André*, *d'Hugues*.

In most nations the wife changes her surname on marriage to that of her husband, in Spain, however, she retains it, and a son may adopt either the paternal or maternal name. In many states of the Union, a man can change his name only by securing a special act of the legislature of his state.

NAMES, PLACES These, like the names of persons, often derive from the language of past races. In many parts of the world they are taken from natural features of the country. *Pen*, or *Ben*, hill, gives rise to the names of hills in England and Wales, as *Penrhys*, *Penzance*, and more in Scotland, as *Ben Nevis*. So also *comb*, valley, as in *Cumberland*, land of valleys. The place names in America show thousands of examples of similar origins, as in the compounding of names made up partly or wholly of such elements. Names ending in *-ton* (town), *-river*, *-land*, *-port*, *-dale*, *-brook*, are examples. In modern times, and especially in America, places have been given names in honor of its most noted citizens, as *Washington*, *Lincoln*, *Jackson*, or of persons who figured largely in its early history, as *New Orleans*, *St. Louis*, *Baltimore*, *Virginia*, *Georgia*. Fortunately, too, in all parts of the western world, the old Indian words for tribes and places have been perpetuated by adopting them as the names of many provinces, states, cities and towns. *Chicago*, *Minnesota*, *Sioux*, *Saskatchewan*, *Dakota*, are familiar examples.

NAMUR, *na moor'*, BELGIUM, a picturesque city of many historic associations, capital of the province of the same name. It is situated at the junction of the Sambre and the Meuse, thirty-five miles southeast of Brussels. Though protected by a circle of nine forts, Namur was captured by the Germans early in the World War, after a fierce bombardment of two days, it remained in their hands throughout the war. Afterward it again became a thriving industrial center, carrying on the manufacture of cutlery, machinery, glass, leather and other commodities. It is in a coal and iron region, and has a prosperous trade. The city's chief buildings include a stately cathedral and a museum of antiquities. Population, 1933, 32,000.

NANAIMO, *nah ny'mo*, B C a town on the east side of Vancouver Island. It is served by the C P R, and maintains steamboat connection with Vancouver. It is the center of British Columbia's largest coal mining region. Lumbering and herring-packing are other important industries. The Hudson's Bay Company founded the town in 1833 by the erection of a blockhouse. Population, 1931, 6,745.

NANA SAHIB, *nah'na sah'hib*, about (1820-?), the leader of the Sepoys in the Indian mutiny. He was adopted by the ruler of the Mahratta State of Bithur, but on the death of the latter the British government refused to recognize Nana's claim to the succession. In May, 1857, there arose a mutiny of the Sepoys in Cawnpore, and Nana, after offering to help the English, treacherously placed himself at the head of the mutineers. The Europeans in Cawnpore capitulated on a promise that they should be sent down the Ganges in safety, but the men were all shot down, and the women and children were massacred, on the approach of a British force. Nana was defeated by Sir H. Havelock, and was driven across the frontier into Nepal. There all knowledge of him ceases, but the general opinion is that he escaped into central Asia.

NANCY, *nahN se'*, FRANCE, capital of the department of Meurthe-et-Moselle, is situated 220 miles east of Paris and ninety-four miles west of Strassburg, on the left bank of the River Meurthe. Though Nancy was repeatedly bombarded during the World War, it was fifteen miles from the farthest German advance and was never captured. However, it suffered considerable material damage. The ancient citadel, the ducal palace and the Hotel de Ville are among the most noteworthy structures. One of the leading universities of France, comprising schools of medicine, law, science, philosophy and pharmacy, is located at Nancy. The chief manufactures of the town consist of broadcloth and other woolen stuffs, cotton goods, hosiery, lace, boots and shoes, embroidery and musical instruments. The trade in peace times is extensive. Population, 1931, 120,578.

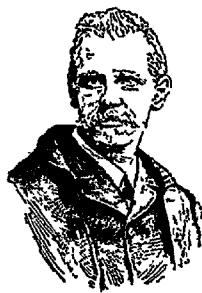
NANKING, CHINA, the largest city and capital of the province of Kiangsu, situated on the Yang-tse-kiang, 194 miles northwest of Shanghai. Here, in 1842, was signed the first treaty with Great Britain. From 1368 to 1403 it was the capital of the Chinese Em-

pire, and in former days was noted for its art and learning and its historic monuments. In the Tai-ping rebellion of 1853 Nanking was captured by the rebels, and its beautiful porcelain tower, many public structures and much of its famous wall were destroyed. The rebels made the city their capital and held it until 1854. In 1928, it was again made the capital by the Nationalist (Kuomintang) Government. In the vicinity are the tombs of the Ming dynasty. Population in 1931, 633,452, reported by customs' authority.

NANSEN, *nahn'sen*, FRIDTJOF (1861-1930), a Norwegian Arctic explorer. He was educated in the University at Christiania, specializing in zoology. Before he was of age he made a notable voyage from Spitzbergen to Greenland to investigate animal life, and in 1888 he made a memorable expedition across Greenland on the ice cap.

The achievement on which his fame as an explorer must rest was an expedition on which he started in June, 1893, from Christiania to the Arctic regions, with twelve companions, in the *Fram*, a vessel constructed to resist the pressure of ice floes. In September of the same year, he thrust his vessel into an ice pack, in which the party drifted, thus imprisoned, for eighteen months, until March, 1895.

Nansen now, with one companion, left the ship and made his way by sledges toward the Pole. After experiencing fearful hardship, he reached latitude 86° 4'. He was then obliged to turn back to an island of the Franz Josef Land archipelago, where he passed the winter. A start for Spitzbergen was made May 19, 1896, and when off Cape Flora he and his companion encountered Captain Jackson, of the British exploring expedition, who took them aboard. During his three years' exile from civilization Nansen passed over hundreds of miles of hitherto unexplored coast, discovered a number of new islands and traversed 50,000 square miles of unknown waters. The highest point reached by him in the Arctic regions was 195 miles nearer the North Pole than any man had ever been before and 261 miles, by



NANSEN

his calculation, from the Pole itself Nansen wrote a popular account of his voyage called *Farthest North*

In 1900 he joined an oceanographic expedition into the Arctic seas, then became director of a laboratory devoted to research of the sea. During the World War he ably assisted Herbert Hoover in feeding a million and a half starving Russians, and later was appointed high commissioner under the League of Nations to care for refugees of Armenia, Russia, and Greece. In 1923 he was awarded the Nobel Peace Prize.

The most important result of Dr Nansen's explorations was his substantiation of the earlier assumption that there is no Arctic continent, but only a very deep ocean. See NORTH POLAR EXPLORATION.

NANTES, *nahNt*, FRANCE, capital of the department of Loire-Inférieure, on the River Loire, 250 miles southwest of Paris. The situation, on an important navigable river, within forty miles of the ocean, is highly advantageous for commerce. Among the chief buildings are the Cathedral of Saint Pierre, the castle of the old Dukes of Brittany, where the edict of Nantes was signed, the Church of Saint Nicholas, a picture gallery containing examples of modern French painting, and the Exchange, one of the most imposing buildings in France. The chief industries are shipbuilding, the manufacture of ships' boilers and machinery, linens, cottons, sail cloth, leather and soap, the production of tobacco goods and the preparation of sardines. Before the conquest of Gaul by the Romans, Nantes was a place of note. The most famous event in its history was the issuing of the famed Edict of Nantes (see below). Population, 1931, 187,350.

NANTES, *Edict* or, a decree issued by Henry IV of France, April 13, 1598, ending the religious wars of the country. It put the Huguenots on an equality with the Catholics in political rights and conceded them greater freedom of worship than they had formerly enjoyed. They were allowed to establish new churches in all parts of the country, except in Paris and its environs and in places of royal residence, and to maintain four theological colleges. However, they were forced to celebrate the Catholic festivals and pay tithes to the Catholic priesthood. In 1685, by a decree of Louis XIV, the edict was revoked. As a consequence of this act, about 500,000 Huguenots went to other countries.

NANTICOKE, PA., in Luzerne County, eight miles southwest of Wilkesbarre, on the Susquehanna River and on the Pennsylvania, the Lackawanna and the Central of New Jersey railroads. The mining of anthracite coal is the principal industry, and there is also considerable manufacturing of implements, hosiery, silk, cement, cigars and canning of fruits. The place was settled about 1850, and was incorporated in 1874. Population, 1920, 22,614, in 1930, 26,043, a gain of 15 per cent.

NANTUCKET, an island off Massachusetts, eighteen miles south of Cape Cod. It is fifteen miles long and from three to four miles wide, and is a popular summer resort because of its delightful climate and scenery. The town of Nantucket is situated on the north side of the island, and has a deep and secure harbor. It is the county seat of Nantucket County, which includes the island and a number of near-by islets.

NAPHTHA, *naft'ha*, or *nap'tha*, one of the numerous products of petroleum. The naphtha oils are among the lightest and therefore among the first to pass off in fractional distillation. Crude oil contains from eight to twenty per cent of naphtha. Naphtha is also obtained in the distillation of wood and coal tar. It is used in the manufacture of paints and varnishes and as a solvent, but it is chiefly employed as a burning-fluid for illumination and as fuel for motors. See PETROLEUM.

NAPLES, *na'pl'z*, ITALY, the third largest city in the kingdom, capital of the province of Naples, situated on the northern shore of the beautiful Bay of Naples, at the foot of Mount Vesuvius, about 120 miles southeast of Rome. It is built partly along the shore, partly on the slope of the hills, and is one of the most picturesque cities in the world. In the modern part there are wide, regular, well-kept streets, and the older portion has been greatly improved by the government in recent years. Among the chief buildings are the cathedral, begun in the thirteenth century, the opera house San Carlo, one of the largest in Europe, the royal palace, with its noteworthy paintings, the old palace, and the National Museum, which contains a remarkable collection of antiquities from Pompeii and Herculaneum. The city has a university which dates from the thirteenth century and is attended by over 6,000 students in normal years. There are

also schools of medicine, engineering, music and military affairs, besides numerous hospitals and charitable institutions. The city is well supplied with street railways, which connect it with various towns.

The manufactures of Naples include macaroni and vermicelli, silks, cottons and woollens, glass, china, musical instruments, artificial flowers, perfumery, soap, machinery and ships. The harbor accommodations are excellent, and the trade is second to none among Italian cities. Naples is one of the most densely populated cities in Europe. In the environs are situated the tomb of Vergil, the ancient Roman cities of Herculaneum and Pompeii and the remains of Roman temples, villages, palaces and tombs.

The place was founded by a Greek colony from the town of Cumae many centuries B.C. It passed to the Romans in the third century B.C. and under them flourished for several centuries. After the fall of the Western Roman Empire, the Ostrogoths held the city for a time, and from them it passed to the Byzantines in the sixth century. In 1130 the Norman Robert Guiscard united the south of Italy and the adjacent island of Sicily into one state, and in that period the history of Naples became a part of the history of the Kingdom of the Two Sicilies, of which Naples was recognized as the metropolis (see SICILIES, KINGDOM OF THE TWO). Population, 1934, including suburbs, 874,126.

NAPLES, BAY OF, an inlet of the Mediterranean Sea on the southwestern coast of Italy, extending from Cape Miseno, its northwestern boundary, to Cape Campanella, its southern limit, a distance of twenty miles. Between it and the open sea are two lovely little islands, Ischia and Capri, about ten miles from shore. The bay, with Naples and other towns and settlements along its shores, and behind them, in sinister grandeur, Vesuvius, rising like a gray wave in the landscape, is famous for its scenic beauty. The bay furnishes good anchorage and is for the most part sheltered from winds.

NAPLES, UNIVERSITY OF, one of the oldest educational institutions in Europe, founded in 1224. It has been several times fully reorganized, the last time in 1860, and since then has gradually become a powerful influence in Southern Europe. Its student enrollment is nearly 7,000, the largest of any university in Italy.



On St Helena,
looking toward France

NAPOLEONI (1769-1821), emperor of the French, conqueror of Europe, and an outstanding figure in world history. He was born at Ajaccio, Corsica, the son of Charles Bonaparte, an advocate, and of Letizia Ramolino. In his tenth year he was sent to the military school of Brienne, and after a short time spent at the military school of Paris he received his commission as lieutenant of artillery.

Early Career In 1792 Napoleon became captain of artillery, and in 1793

was sent to assist in the reduction of Toulon, then in the hands of the British. The place was captured almost entirely through his strategic genius, and in the following February he was made a brigadier-general of artillery. In 1795, when the mob of Paris rose against the Convention, Napoleon was made commander of the 5,000 troops provided for its defense. He had only a night to make arrangements, and next morning he cleared the streets with grape, disbanded the National Guard, disarmed the populace and ended the outbreak. Early in 1796 Bonaparte married Josephine de Beauharnais, the charming widow of a French army officer. Subsequently he departed to assume the command of the army of Italy against the forces of Austria and Sardinia. By a series of victories, culminating in that of Lodi, he forced Naples, Modena and Parma to conclude a peace, the Pope was compelled to sign an armistice, and the whole of Northern Italy was in the hands of the French Army. After army sent by Austria was defeated, and Napoleon carried the war into the enemy's country and by the Peace of Campo Formio, 1797, compelled Austria to cede the Netherlands and Lombardy in return for the Province of Venetia. The Pope had previously been forced to cede part of his dominions.

Invasion of Egypt and Syria In December, 1797, Napoleon returned to Paris, where his favor with the people was great. The Directors, fearing him on account of his newly acquired influence, were anxious to get him out of France, and a plan soon presented itself. Realizing that, after Austria, England

was the most dangerous enemy which France had, the Directors determined to strike a blow at her by invading Egypt, as a preliminary step to the conquest of British India. Napoleon was put in command of the expedition, and in July, 1798, he landed at Alexandria. This city fell after a short resistance, and Cairo was taken within the same month, after the sanguinary Battle of the Pyramids. In August the word reached the army in Egypt that Nelson had annihilated the French fleet in the Bay of Aboukir. All means of return to Europe for the French were thus cut off, but Napoleon, having suppressed with rigor a riot in Cairo, advanced to attack the Turkish forces assembling in Syria. He took El Arish and Gaza and stormed Jaffa, but after sixty days' siege he was compelled to abandon the attempt to capture Acre, which was defended by a Turkish garrison, assisted by Sir Sidney Smith and a small body of English sailors and marines. Bonaparte returned to Egypt in June, 1799, and in July attacked and almost annihilated a Turkish force which had landed at Aboukir.

Supreme in France On August 22 he abandoned the command of the army to Kléber and sailed for France, having learned that the Directory was in danger through a Royalist rising and that the people were longing for a return of some sort of order. He secured the cooperation of his brother Lucien, Talleyrand, Siéyès and others, and by a sudden stroke he abolished the Directory on the 18th and 19th Brumaire (November 9 and 10). A new constitution was then drawn up, chiefly by Siéyès, under which Napoleon was made first consul, with Cambacérès and Lebrun as second and third consuls. From this time Napoleon was virtually ruler of France.

His government was marked by sagacity, activity and vigor in the administration of civil affairs, by the proclamation of complete freedom of religious worship, by the reconstruction of the school system and by the compilations of the famous body of laws known as the Code Napoleon. But war was his element, and in 1800 he resolved to strike a blow at Austria. Having executed a daring march into Italy across the Great Saint Bernard, he defeated the Austrians at Marengo, and after the decisive Battle of Hohenlinden forced Austria to conclude peace by the Treaty of Lunéville. Treaties were subse-

quently concluded with Spain, Naples, the Pope, Bavaria, Portugal, Russia and Turkey, and finally, the Treaty of Amiens was signed by England. In 1802 Napoleon was proclaimed by a decree of the senate consul for life, and in 1804 he had himself crowned as emperor, nearly 3,000,000 votes of the people being given in favor of this measure.

Reorganization of Europe In 1803 war had again broken out with Great Britain, and Napoleon collected an army and a fleet which were to invade England. In 1805 Britain, Russia, Austria and Sweden united against Napoleon, who marched at once across Bavaria at the head of the army collected for the invasion of England and compelled the Austrian General Mack to capitulate at Ulm. This surrender occurred on the day before Nelson by his great victory at Trafalgar established the British supremacy on the sea. In November, Napoleon entered Vienna, and in the following month he completely routed the allied Russian and Austrian armies at Austerlitz. This was one of his greatest victories, and the Austrian emperor immediately sued for peace, giving up to France all his Italian and Adriatic territories.

Napoleon now turned to the organization of the territory which had come into his power. Early in 1806, a French army occupied the continental part of the Neapolitan states, and Joseph Bonaparte was declared king, on the deposition of their former sovereign. Another brother of the emperor, Louis, became king of Holland, and various districts in Germany and Italy were erected by the conqueror into dukedoms and bestowed upon his most successful generals. This brought him into collision with Prussia, and war was declared. Late in 1806 Napoleon defeated the enemy at Jena, while one of his generals on the same day gained the victory of Auerstadt. These were two of his most important victories.



NAPOLEON

On October 25 Napoleon entered Berlin and issued the celebrated Berlin Decree, thus instituting the important Continental System, a commercial war against England. He then marched northward against the Russians, who were advancing to assist the Prussians. At Pultusk and at Eylau he met with severe checks, but in the summer of 1807 the Battle of Friedland was fought, which was so disastrous to the Russians that Alexander was compelled to sue for an armistice. The result was the Peace of Tilsit, by which the king of Prussia received back half of his dominions and Russia undertook to close its ports against British vessels. The duchy of Warsaw was erected into a kingdom and given to the king of Saxony, the kingdom of Westphalia was formed and bestowed upon Jerome, Napoleon's youngest brother, Russia obtained a part of Prussian Poland, and by secret articles was allowed to take Finland from Sweden.

As Portugal had refused to respect the Berlin Decree, Napoleon now sent Junot to occupy Lisbon, and because the administrative affairs of Spain had fallen into confusion, he sent into that kingdom an army under Murat, which took possession of the capital. By the Treaty of Bayonne Charles IV was obliged to resign the Spanish crown, which was given to Joseph Bonaparte, Murat receiving the vacant sovereignty of Naples. The great body of the Spanish people rose against this summary disposal of the national crown, and Britain aided them in their resistance. Thus was begun the Peninsular War, which lasted seven years. In the meantime Austria again declared war and got together an army in splendid condition, under the Archduke Charles. Napoleon hurried into Bavaria, encountered the archduke at Eckmühl, completely defeated him and entered Vienna.

He was himself defeated at Aspern and Esslingen, but at Wagram (1809) the Austrians were completely crushed, and Napoleon was thus enabled to dictate his own terms of peace. On his return to Paris, Napoleon divorced Josephine, who had borne him no children, and soon afterward married the Archduchess Maria Louisa, of Austria, thus entering into closer relations with that country.

Decline and Downfall The years 1810 and 1811 were the period of Napoleon's greatest power. But now the tide began to turn. Russia found it impossible to carry out the

continental blockade and give due effect to the Berlin Decree, accordingly in May, 1812, Napoleon declared war against that country and soon invaded it with an army of nearly 600,000 men. The Russians retired step by step, wasting the country, carrying off all supplies and avoiding as far as possible general engagements. The French pushed rapidly forward, defeated the Russians at Borodino and elsewhere and entered Moscow only to find the city on fire. It was impossible to pursue the Russians farther, and nothing remained but retreat. The winter was uncommonly severe, and swarms of mounted Cossacks, incessantly harassed the French, now sadly demoralized by cold, famine, disease and fatigue. Of the invaders, only about 25,000 left Russia. Napoleon immediately ordered a fresh conscription, but the spirit of Europe was now fairly roused. A coalition, consisting of Prussia, Russia, Great Britain, Sweden and Spain, was formed, which early in 1813 sent its forces toward the Elbe.

Napoleon defeated the allies at Lutzen, at Bautzen and at Dresden, but the last was a dearly-bought victory for the French, who were now so outnumbered that their chief was compelled to fall back on Leipzig. There he was completely hemmed in, and in the great "Battle of the Nations," which was fought October 16, 18 and 19, he was completely defeated. He succeeded in raising a new army, and from January to March, 1814, he confronted the combined host of the allies. But numbers were against him, and Wellington rapidly advanced upon Paris from the south. The last of March the allies captured the fortifications of Paris and entered the city, and early in the following month Napoleon abdicated at Fontainebleau. He was allowed the sovereignty of the island of Elba, with the title of emperor and a revenue of 6,000,000 francs.

The Hundred Days. After a residence of ten months he made his escape from the island and landed at Fréjus, March 1, 1815. Ney and a large part of the army joined him, and he made a triumphal march upon Paris, driving Louis XVIII from the throne. The allied armies once more marched toward the French frontier, and Napoleon advanced into Belgium to meet them. June 16 he defeated Blücher at Ligny, while Ney held the British in check at Quatre-Bras. Wellington fell back upon Waterloo, where he was attacked

by Napoleon on the 18th, the result being the total defeat of the French. The allies marched without opposition upon Paris. Napoleon abdicated in favor of his son and tried to escape from France, but failing, he surrendered to the captain of a British man-of-war. With the approval of the allies he was conveyed to the island of Saint Helena, where he was confined for the rest of his life. He died in 1821, of cancer, and was buried in the island, but in 1840 his remains were transferred to the Hôtel des Invalides at Paris.

Related Articles See map of three conquests in the article Europe. Consult the following titles for additional information.

Austerlitz	Lepzig, Battles of
Blucher, Gebhard	Louisiana Purchase
Bonaparte	Lutzen Battles of
Continental System	Marengo, Battle of
Corsica	Maria Louisa
Directory	Nelson, Horatio
Elba	Saint Helena
French Revolution	Traitor
Jena, Battle of	Waterloo, Battle of
Josephine, Marie	Wellington, Duke of

NAPOLEON II. See REICHSTADT, NAPOLEON FRANÇOIS JOSEPH BONAPARTE, Duke of.

NAPOLEON III, CHARLES LOUIS NAPOLEON BONAPARTE (1808-1873), emperor of the French. He was the youngest son of Louis Bonaparte, brother of Napoleon I and king of Holland, and of Hortense Beauharnais. On the death of his cousin, the Duke of Reichstadt, he became the recognized head of the Bonaparte family, and thenceforth his one ambition was to occupy his uncle's imperial throne. In 1836 an attempt was made to secure the garrison of Strassburg, but the affair turned out a ludicrous failure. In 1840 he made a foolish and theatrical descent on Boulogne, was captured, tried and sentenced to perpetual confinement in the fortress of Ham, but after six years of imprisonment he escaped to England. On the outbreak of the Revolution of 1848, he hastened to Paris, and, securing a seat in the National Assembly, began at once his candidacy for the presidency. On the day of the election, it was found that he had received a majority of four million. In December, 1851, the president declared Paris in a state of siege, issued a decree dissolving the Assembly and another ordering the reestablishment of universal suffrage and the election of a president for ten years. When the vote came to be taken, an enormous majority was in favor of his retaining office for ten years, with all the powers he demanded.

As soon as he found himself fully confirmed in this ambition, he began to prepare for the restoration of the Empire. In January, 1852, the National Guard was revived, a new constitution was adopted and new orders of nobility were issued, and at last, on December 1, Louis Napoleon Bonaparte was proclaimed emperor, under the title of Napoleon III. In March, 1854, Napoleon III, in conjunction with England, declared war in the interest of Turkey against Russia, and in 1859, when war was declared between Austria and Sardinia, Napoleon took up arms in favor of his Italian ally, Victor Emmanuel.

In 1861 France dispatched an expedition to Mexico for the purpose of exacting redress of injuries. An imperial form of government was instituted, Maximilian, archduke of Austria, being placed at its head, with the title of emperor. Napoleon then withdrew his army, and the unfortunate Maximilian, left without protection, was captured and shot. On the conclusion of the Austro-Prussian War of 1866, Napoleon, jealous of the growing power of Prussia, demanded a reconstruction of frontier, which was peremptorily refused. The ill-feeling between the two nations was increased by various causes, and in 1870, war was declared by France. Prussia was well prepared for the struggle, which had long been foreseen in that country, but Napoleon seems to have been greatly deceived as to the state of France. The disastrous close of the war, therefore, was a great surprise to him (see FRANCO-GERMAN WAR). After the surrender at Sedan he was kept a prisoner for a time, and then he joined his wife and son in England, where he remained till his death. His only child, the prince imperial, who joined the British army in South Africa as a volunteer, was killed by Zulus. See EUGÉNIE-MARIE DE MONTIJO.

NAPRAVNÍK, EDWARD (1839-1915), a musical composer and orchestra leader of Czech origin, a Bohemian by birth. Handicapped in his youth by poverty, it was only through great self-denial that he gained ability to rise to the post of conductor at a St. Petersburg (Leningrad) theater. Under his genius that theater became the home of Russian opera. He found time to write a great deal of music, most famous among his productions was the popular opera *Francesca di Rimini*. He also composed four symphonies.

NARBADA, *nur bud'a* See **NERBUDDA**

NARCISSUS, *nar sis'sus*, according to Greek mythology, the son of the river god Cephissus. He possessed rare beauty, but was excessively vain. Echo, a nymph who loved him, pined away to a mere voice, because her love for him found no return, and Nemesis, determined to punish him for his coldness of heart, caused him to drink at a certain fountain, wherein he saw his own image, with which he fell violently in love. With this passion he, too, pined away, until the gods transformed him into the flower which still bears his name.

NARCISSUS, a genus of bulbous plants, mostly natives of Europe. The plants, because of the beauty of their crisp, lilylike foliage and the fragrance and delicacy of their blossoms—yellow or white—are widely cultivated. The white narcissus is success-



NARCISSUS

fully cultivated without soil, in a bowl of water, the bulbs supported by pebbles, and is among the most satisfactory of winter house plants. The yellow daffodils and jonquils, allied species, make their appearance in the open with the earliest spring flowers. Some of the more hardy members of this family grow wild in English meadows and hedges.

NARCOTIC, a substance which, in small doses, diminishes the action of the nerves and brings on sleep. Most narcotics are stimulating when given in moderate doses, in larger doses they produce sleep, and in poisonous doses they bring on stupor, convulsions and even death. Opium, hemlock, henbane, belladonna, aconite, camphor, digitalis, tobacco, alcohol and leopard's bane are well-known narcotics, and of late years there has been introduced a new series, derived from coal tar. These include phenacetine, acetanilid and sulphonal. While narcotics are at times absolutely necessary to relieve pain or induce sleep, their action is so uncertain and so dependent on the physical condition of the person to whom they are administered that they should seldom if ever be used without expert advice.

Related Articles. Consult the following titles for additional information:

Belladonna	Cocaine	Opium
Chloral	Morphine	Tobacco

NARRAGANSETT, in colonial times, a leading Indian tribe occupying Long Island and the present state of Rhode Island. They cherished the friendship of Roger Williams, but joined in King Philip's War, losing nearly 1,000 men in the famous Swamp Fight. After the death of their leader, Canonius, they were quickly subdued, and now survive only in mixed bloods.

NARRAGANSETT BAY, an inlet of the Atlantic Ocean, which extends into Rhode Island for nearly thirty miles, almost to Providence. Newport is situated near the southern end of the bay, which at its mouth is less than five miles wide. Its greatest width is eight miles.

NARVAEZ, *nahr'wah'eth*, **PANFILO DE** (1470?-1528), a Spanish adventurer and explorer, who, in 1528, left Cuba with an expedition for the purpose of exploring the southeastern part of what is now the United States. He was betrayed and misled by Indian guides and was finally forced to put to sea. After cruising along the Gulf coast for several months, his party reached the mouth of the Mississippi. Two of the boats were swept to destruction by the rush of the river current and Narvaez's was lost in a storm.

NARWHAL, *nahr'wahl*, a marine mammal, about fifty feet long, found in cold waters of the northern hemisphere. Its body, tapering like the whales, ends in a fishlike tail, and on each side of it, near the head, is a bump resembling a fin. It has no teeth,

but between the eyes is a straight, hollow spiral tusk, which tapers to a point and measures about seven feet in length. This tusk is of hard, white material, somewhat like



NARWHAL

ivory, for which it is often substituted in commerce. The animal feeds chiefly on mollusks. The Greenlanders obtain an oil from the blubber, which they use much as they use whale oil, and make the skins into various articles. The narwhal is sometimes called *sea unicorn*, *unicorn fish* and *unicorn whale*.

NASEBY, nas'by, BATTLE OF, a famous battle, fought on June 14, 1645, in the parish of Naseby, in Northampton, England. The struggle was between Charles I and the Parliamentary army under Fairfax and Cromwell, and it ended in the complete defeat of the royalists.

NASHUA, N H., the second city in size in the state and the county seat of Hillsboro County, forty miles northwest of Boston, on the Nashua River near the Merrimac, and on several divisions of the Boston & Maine railroad. Nashua is essentially a manufacturing city. A canal from the Nashua to the Merrimac furnishes good water power, and there are large cotton mills, and manufactures of machinery, paper, boilers, furniture, shoes, saddlery and hardware. The city has a public library, a sanitarium, a Federal building, a court house and a United States fish hatchery. The place was settled in 1655. It was incorporated as the Township of Dunstable in 1673, was given its present name in 1746 and chartered as a city in 1853. Population, 1920, 28,379, in 1930, 31,463, a gain of 11 per cent.

NASHVILLE, BATTLE OF, an important battle of the Civil War, fought at Nashville, Tenn., December 15 and 16, 1864, between a Federal force under General Thomas, and the Confederate Army of the Tennessee under General Hood. The latter had evacuated Atlanta early in September and had struck northward, hoping to draw Sherman from his proposed march to the sea. Sherman dispatched Thomas to defend Tennessee and

provided him with ample forces, including cavalry under General Wilson, numbering all told about 55,000. At Franklin, on November 30, General Hood attacked the Federal forces but was repulsed. He reached the vicinity of Nashville, December 2, but Thomas delayed an engagement until December 15, when after a two-days battle he completely routed Hood's army. The Confederate force was never reorganized.

NASHVILLE, TENN., the second city in size in the state, the state capital and the county seat of Davidson County, is 200 miles northwest of Memphis, it extends on both sides of the Cumberland River. It is on the Nashville, Chattanooga & St. Louis, the Louisville & Nashville, and the Tennessee railroads. The city is also served by an inter-urban electric line, several bus lines, and two landing fields for airplanes. The city has 23 parks containing 2,100 acres. The national cemetery contains the graves of 16,643 soldiers. The Parthenon is a replica of the famous structure at Athens. The state capitol on Cedar Hill is the most important structure in the city. Near it are the tomb of James K. Polk and an equestrian statue of Andrew Jackson. Jackson's famous home, "The Hermitage" is 10 miles from the city.

Nashville is an educational center of importance, containing Vanderbilt University, George Peabody College for Teachers, Ward-Belmont School, Scarritt College for Christian Workers, the Nashville Conservatory of Music, David Lipscomb College, Vanderbilt Medical School, and for the Negroes, Fisk University, Meharry Medical College and a teachers college. Other important institutions are four general hospitals, a hospital for the insane, a school for the blind, an industrial school and the state penitentiary. There are 14 libraries and 267 churches.

Nashville is an important center for manufactures, wholesale and retail trade and agriculture. It leads in the production of cellophane and rayon. Other industries are printing and publishing, tobacco manufacture, car construction and repairs, meat packing, clothing, boots and shoes, cereal preparations, stoves and ranges, bakery products and many others. The total number of establishments engaged is about 284.

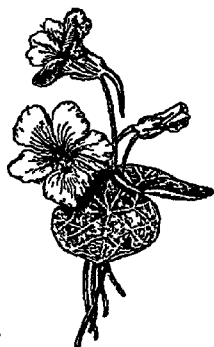
It was James Robertson of East Tennessee with eight companions who decided in 1779 to establish a settlement at the site on which Nashville stands. Other colonists arrived

shortly after and "Nashborough" became a new outpost of civilization. The present name was adopted at the time of incorporation in 1784, it became the state capital in 1843. The Southern Convention that denounced the Wilmot Proviso met here in 1850. The battle of Nashville (which see) was fought in 1864. The Tennessee Centennial Exposition was held at Nashville in 1897. The city is governed by a mayor and council, with three commissioners. Population, 1920, 118,342, 1930, 153,866, a gain of 30 per cent.

NA'SMYTH, JAMES (1808-1890), a Scotch engineer, born and educated at Edinburgh. He became a manufacturer of machine tools, and developed a large industry. The steam hammer, which has rendered possible the immense forgings now employed, was invented by him in 1839. The steam pile driver and the safety foundry ladle are among his other inventions. He also achieved distinction as an astronomer. See **STEAM HAMMER**.

NAST, THOMAS (1840-1902), an American caricaturist, illustrator and painter, born in Bavaria. At the age of six he emigrated with his parents to America, and when only twenty he contributed cartoons on the Civil War to American and English periodicals. Returning to America from a trip to Italy he became connected with *Harper's Weekly*, for which his best work was done. In his particular line, pictorial satire, Nast stands in the foremost rank. His severe and pointed caricatures did much toward breaking up the notorious Tweed "ring" of New York. Nast also produced some creditable oil paintings. He originated the "Tammany tiger," the "Republican elephant" and the "Democratic donkey," which have been retained as popular designations to the present day.

NASTURTIIUM, *nas tur'shum*, a genus of plants native to South America and Mexico, and widely cultivated everywhere for ornamental purposes. Both the climbing and bushy varieties, the latter much used for garden borders,



NASTURTIIUM

are rapid growers and prolific bloomers. The glossy leaves and stems, which are crisp and juicy, and have a pungent flavor, are much used in salads. The flowers are gorgeously colored, red, yellow and pink predominating in North America.

NATAL, *na tahl'*, a province in the Union of South Africa. It has an area of 35,284 square miles and is nearly as large as the state of Indiana. The climate is sub-tropical and is well-suited to white persons. The census of 1931 gave a population of about 1,500,000; of these 158,000 were Europeans. Sugar, cereals, tanning bark, mining and whaling are very valuable industries.

Natal was annexed to Cape Colony in 1844 but was given a separate government under British officers the next year, in 1856 it became a self-governing colony, and in 1910 it entered the Union of South Africa. The capital of the province is Pietermaritzburg, the population of the city is more than 36,000, of which one-half are Europeans.

See also **UNION OF SOUTH AFRICA**.

NATCH'EZ, Miss, the county seat of Adams County, 100 miles southwest of Jackson, on the Mississippi River and on the Mississippi Central, Illinois Central, Missouri Pacific, Louisiana & Arkansas and the Texas & Pacific railroads. There are also four bus lines and an airport. The site of the city is on a bluff 200 feet above the river. Important buildings and institutions are the municipal building, the memorial hall, the high school auditorium, Natchez College (for Negroes), and Jefferson Military College, which is six miles distant. There are three large parks. A national military cemetery adjoins the city.

Many points of historical interest draw thousands of visitors annually the home where Jefferson Davis married, another home where Andrew Jackson wooed and won his wife, the headquarters of General Grant, numerous estates such as the homestead of Winthrop Sargent, first territorial governor, and the estate of General Monmouth.

Industrial establishments produce boxes, candy, mill products, cottonseed oil and textiles.

The Indians destroyed the French fort in 1729. The English came into possession in 1763, but the Spaniards captured the place in 1779, in 1798 the United States took possession. Natchez was capital of the state from 1798 to 1820. Population, 1930, 13,422.

NATHAN, GEORGE JEAN (1882-), an American editor and critic, a native of Indiana, was graduated from Cornell University (1904) and from the University of Bologna, Italy (1905). His active work began as a dramatic critic, from which he advanced to high rank as a dramatic editor. With H. L. Mencken he was editor of *Smart Set*, and the two later founded *The American Mercury*, with which he was associated until 1930. Nathan was editorial contributor to the *London Express*, and later guest critic in London. With others, he founded and edited *The American Spectator* (1932).

NATIONAL CIVIC FEDERATION, an organization formed in New York in 1900-1901 for the purpose of investigating, discussing and solving, so far as possible, great social and industrial problems. The list of its departments suggests the scope of the federation's activities:

- 1 Industrial conciliation department, dealing with industrial controversies;
- 2 Industrial economics department.
- 3 Welfare department, interested in the working condition of employees.
- 4 Women's department, investigating the welfare of women wage earners.
- 5 Department of compensation for Industrial Accidents and their prevention.
- 6 Social Insurance department.
- 7 Department on regulation of combinations and trusts.
- 8 Department on regulation of interstate and municipal utilities.

NATIONAL DEBT, - the aggregate of money owed by a government to individuals, corporations or other governments, for amounts borrowed for any purpose of government, either in war or peace. At various periods economists have been alarmed at the growth of the debts of nations, but it was proved many times that the rapid growth in national wealth has justified increasing indebtedness. However, most debts of this nature have been due to the heavy demands of war.

The credit of the state is so secure at times that money may be borrowed without setting a date for repayment. Trustees of large funds are willing to lend money to the government if the security seems unquestionable and if the date of redeeming the bonds is long deferred.

Generally speaking, the smaller the national debt the more sound is the financial condition of the state's finances. But smaller nations often find it desirable to borrow

heavily in order to finance internal improvements, such ventures have often proved successful.

In time of war or of internal disaster it is customary for any nation to increase the national debt. The World War was financed by means of loans, the debts incurred amounted to a total of \$150,000,000,000. Consequently the states involved have been very seriously crippled financially.

A state may become so burdened with debt that it will repudiate the obligation and refuse to make further payments. But the Bolshevik government of Russia repudiated the debts owed by the Czarist regime on theoretical grounds, refusing to bear a burden created by a capitalist government. Ordinarily no remedy can be found for the repudiation of a national obligation.

"Balancing the budget" is in effect a refusal to increase the national debt. It is limiting expense to the amount of income. Progressive thinkers urge that government lend money and incur debt if necessary in times of financial depression so as to undergird private finance. Then in times of prosperity the government should undertake to reduce the debt and perhaps maintain a balanced budget.

The types of debts which a state may incur include, in the case of the United States, interest-bearing bonds of three kinds "pre-war" bonds, Liberty bonds and treasury bonds, then there are treasury notes, certificates of indebtedness, and treasury bills. There are also special issues for investment of trust funds and postal savings funds such as postal savings bonds, treasury notes, and certificates of indebtedness. Lastly there is the matured debt on which interest has ceased. Interest on the national debt of the United States in one year has reached the sum of \$689,000,000.

The degree to which nations are willing to increase their debts is indicated by the following staggering figures which show the amounts owed at the end of a fiscal year: United States, \$31,469,000,000, Great Britain, \$37,189,793,000, Germany, \$2,917,235,400, Italy, \$5,196,583,000, France, \$18,022,027,520, Poland \$477,197,820. These amounts fluctuate from day to day.

NATIONAL EDUCATION ASSOCIATION. See EDUCATION ASSOCIATION, NATIONAL.

NATIONAL GUARD, or **MILITIA**, a body of citizens of a state trained at state

expense in the manual of arms and, to some degree, in the arts of war. In simplest phrase, they are citizen soldiers. In time of peace the members of the Guard have no duties beyond regular drills, in times of riot or insurrection, the governor of the state may call as many companies or regiments of the Guard as he may deem necessary to maintain order in the disturbed area.

Except when the nation is imperilled the National Guard is purely a state institution. The Constitution of the United States (Art. I, Sec. 8) authorizes Congress—

to provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions.

After the organization of the regular army that body was charged with the responsibilities named above. In time of national danger, such as the World War developed in the United States in 1917, the Federal government is justified in calling the Guard to national service. This step was taken in that year, the National Guard of all the states was ordered into sixteen great cantonments to drill for participation in the war in Europe. The identity of the Guard was lost in the army divisions then created.

Organizations. As reorganized in 1916 by act of Congress the National Guard was to consist of at least 800 enlisted men for each Senator and Representative in Congress, and a number to be designated by the President for each territory. The Guard of a state was forbidden to disband without the consent of the President, nor could a state allow the number of men to be reduced below the prescribed number. The period of enlistment was placed at six years—three in the active organization and three in the reserve.

For the upkeep of the National Guard the United States government provides equipment and supplies, the various state governments furnish armories for the local groups and their equipment. The Federal government makes appropriations for compensation during periods of training.

The Militia. The word *militia*, in its true sense, refers to all able-bodied men between the ages of eighteen and forty-five. They are bound by obligation to respond to call for military duty in time of need. The militia, therefore, is unorganized, the National Guard is an organized portion of a state's militia strength. See **ARMY, WORLD WAR**.

NATIONAL MUSEUM OF THE UNITED STATES, a branch of the Smithsonian Institution, founded according to Congressional act in 1846. It contains the government collections in the arts, in geology, zoology, botany, ethnology and archaeology. The building which houses these wonderful collections is a handsome stone structure near the Smithsonian building, on the west side of the Mall, Washington. In the center of the building is the rotunda and dome, where, above the fountain's basin, is the plaster cast of Crawford's *Statue of Liberty*, that surmounts the dome of the Capitol. Among the historic relics of particular interest are articles that belonged to Washington, Jefferson, Jackson, Franklin and Grant. An almost endless number of articles illustrate the life of peoples from the aborigines of America to the most enlightened of modern societies. Besides these, there is a rich collection of natural-history specimens including rare stuffed animals. Although the halls of the National Museum are already crowded, they contain only a part of the great collections belonging to the government.

NATIONAL ROAD. See **CUMBERLAND ROAD**.

NATIONS, LAWS OF. See **INTERNATIONAL LAW**.

NATIONS, LEAGUE OF, a worldwide union of states, originating in an international covenant signed in 1919 by the representatives of all the principal nations of the earth which at the time were considered as possessing responsible governments. It was intended to form an international coalition which should so command the destinies of the world as to make war thereafter practically impossible and by moral force and economic pressure secure justice for all peoples.

The suggestion respecting a league of nations was brought forward in 1918 by President Woodrow Wilson as one of the fourteen bases on which he believed the awful war in which over twenty nations were then engaged could be honorably ended and future peace assured. The plan was loudly acclaimed in some sections and in others ridiculed as Utopian.

The peace conference, which held meetings in Paris for the first four months of 1919, before moving to Versailles, prepared the compact and published the first draft of the proposed league in March. Its weaknesses were pointed out and features objectionable to some of the countries were vigorously dis-

cussed The document was then remade in part, and given to the world in completed form in April

The covenant is not strong, as viewed by France, for there is no power to ascertain military facts and no provision for the exchange of military information France with 40,000,000 people felt that at some future time Germany with nearly twice that number, might again menace its frontiers There is no provision for strong military and naval display against unruly members by a supernational body—otherwise, no international police force to compel obedience to the mandates of the league Radical provisions naturally failed to get conservative support, conservative policies did not please the more radical element The best opinion seems to incline to the belief that some good has been accomplished, however, and that the league will grow in strength, under capable guidance The amending article and the clause concerning the admission of new members would seem to make certain the steady, if gradual, fulfilment of the promise of a world organization of all nations that are fit to govern themselves and to respect the rights of other nations The use that ultimately to be made of this instrument depends entirely upon the nations of the world

The covenant of the League of Nations was ratified by all the leading nations of the world, with the single exception of the United States

The Articles The constitution of the league, article by article, is as follows—

Preamble

THE COVENANT OF THE LEAGUE OF NATIONS

In order to promote international co-operation and to achieve international peace and security, by the acceptance of obligations not to resort to war, by the prescription of open, just, and honorable relations between nations, by the firm establishment of the understandings of international law as to actual rule of conduct among governments, and by the maintenance of justice and a scrupulous respect for all treaty obligations in the dealings of organized peoples with one another, the high contracting parties agree to this covenant of the league of nations

Article One

The original members of the league of nations shall be those of the signatories which are named in the annex to this covenant and also such of those other states named in the annex as shall accede without reservation to this covenant Such accessions shall be effected by a declaration deposited with the

secretariat within two months of the coming into force of the covenant. Notice thereof shall be sent to all other members of the league

Any fully self-governing state, dominion, or colony not named in the annex, may become a member of the league if its admission is agreed by two-thirds of the assembly, provided that it shall give effective guarantees of its sincere intention to observe its international obligations and shall accept such regulations as may be prescribed by the league in regard to its military and naval force and armaments

Any member of the league may, after two years' notice of its intention so to do, withdraw from the league provided that all its international obligations and all its obligations under this covenant shall have been fulfilled at the time of its withdrawal

Article Two

The action of the league under this covenant shall be effected through the instrumentality of an assembly and of a council, with permanent secretariat

Article Three

The assembly shall consist of representatives of the members of the league

The assembly shall meet at stated intervals and from time to time as occasion may require, at the seat of the league, or at such other place as may be decided upon

The assembly may deal at its meetings with any matter within the sphere of action of the league or affecting the peace of the world

At meetings of the assembly each member of the league shall have one vote, and may have not more than three representatives

Article Four

The council shall consist of representatives of the United States of America, of the British empire, of France of Italy, and of Japan, together with representatives of four other members of the league These four members of the league shall be selected by the assembly from time to time in its discretion Until the appointment of the representatives of the four members of the league first selected by the assembly, representatives of — shall be members of the council

With the approval of the majority of the assembly the council may name additional members of the league whose representatives shall always be members of the council, the council with like approval may increase the number of members of the league to be selected by the assembly for representation on the council

The council shall meet from time to time as occasion may require and at least once a year, at the seat of the league or at such other place as may be decided upon

The council may deal at its meetings with any matter within the sphere of action of the league or affecting the peace of the world

Any member of the league not represented on the council shall be invited to send a representative to sit as a member at any meet-

ing of the council during the consideration of matters specially affecting the interests of that member of the league

At meetings of the council each member of the league represented on the council shall have one vote, and may not have more than one representative

Article Five

Except where otherwise expressly provided in this covenant, decisions at any meeting of the assembly or of the council shall require the agreement of all the members of the league represented at the meeting

All matters of procedure at meetings of the assembly or of the council, the appointment of committees to investigate particular matters, shall be regulated by the assembly or by the council, and may be decided by a majority of the members of the league represented at the meeting

The first meeting of the assembly and the first meeting of the council shall be summoned by the president of the United States of America

Article Six.

The permanent secretariat shall be established at the seat of the league. The secretariat shall comprise a secretariat general and such secretaries and staff as may be required

The first secretary general shall be the person named in the annex, thereafter the secretary general shall be appointed by the council, with the approval of the majority of the assembly

The secretaries and the staff of the secretariat shall be appointed by the secretary general, with the approval of the council

The secretary general shall act in that capacity at all meetings of the assembly and of the council

The expenses of the secretariat shall be borne by the members of the league, in accordance with the apportionment of the expenses of the international bureau of the Universal Postal Union

Article Seven.

The seat of the league is established at Geneva.

The council may at any time decide that the seat of the league shall be established elsewhere

All positions under or in connection with the league, including the secretariat, shall be open equally to men and women

Representatives of the members of the league and officials of the league, when engaged on the business of the league, shall enjoy diplomatic privileges and immunities

The buildings and other property occupied by the league or its officials, or by representatives attending its meetings, shall be inviolable

Article Eight

The members of the league recognize that the maintenance of a peace requires the reduction of national armaments to the lowest point consistent with national safety and the enforcement by common action of international obligations

The council, taking account of the geographical situation and circumstances of each estate, shall formulate plans for such reduction for the consideration and action of the several governments

Such plans shall be subject to reconsideration and revision at least every ten years

After these plans shall have been adopted by the several governments limits of armaments therein fixed shall not be exceeded without the concurrence of the council

The members of the league agree that the manufacture by private enterprise of munitions and implements of war is open to grave objections. The council shall advise how the evil effects attendant upon such manufacture can be prevented, due regard being had to the necessities of those members of the league which are not able to manufacture the munitions and implements of war necessary for their safety

The members of the league undertake to interchange full and frank information as to the scale of their armaments, their military and naval programs, and the condition of such of their industries as are adaptable to warlike purposes

Article Nine.

A permanent commission shall be constituted to advise the council on the execution of the provisions of article one and on military and naval questions generally

Article Ten.

The members of the league undertake to respect and preserve, as against external aggression, the territorial integrity and existing political independence of all members of the league. In case of any such aggression or in case of any threat or danger of such aggression, the council shall advise upon the means by which this obligation shall be fulfilled

Article Eleven.

Any war or threat of war, whether immediately affecting any of the members of the league or not, is hereby declared a matter of concern to the whole league, and the league shall take any action that may be deemed wise and effectual to safeguard the peace of nations. In case any such emergency should arise, the secretary general shall, on the request of any member of the league, forthwith summon a meeting of the council

It is also declared to be the fundamental right of each member of the league to bring to the attention of the assembly or of the council any circumstance whatever affecting international relations which threatens to disturb either the peace or the good understanding between nations upon which peace depends

Article Twelve.

The members of the league agree that if there should arise between them any dispute likely to lead to a rupture, they will submit the matter either to arbitration or to inquiry by the council, and they agree in no case to resort to war until three months after the award by the arbitrators or the report by the council

In any case under this article, the award of the arbitrators shall be made within a reasonable time, and the report of the council shall be made within six months after the submission of the dispute.

Article Thirteen.

The members of the league agree that, whenever any dispute shall arise between them which they recognize to be suitable for submission to arbitration and which cannot be satisfactorily settled by diplomacy, they will submit the whole subject matter to arbitration. Disputes as to the interpretation of a treaty, as to any question of international law, as to the existence of any fact which if established, would constitute a breach of any international obligation, or as to the extent and nature of the reparation to be made for any such breach, are declared to be among those which are generally suitable for submission to arbitration. For the consideration of any such dispute the court of arbitration to which the case is referred shall be the court agreed on by the parties to the dispute or stipulated in any convention existing between them.

The members of the league agree that they will carry out in full good faith any award that may be rendered, and that they will not resort to war against a member of the league which complies therewith. In the event of any failure to carry out such an award the council shall propose what steps should be taken to give effect thereto.

Article Fourteen.

The council shall formulate and submit to the members of the league for adoption plans for the establishment of a permanent court of international justice. The court shall be competent to hear and determine any dispute of an international character which the parties thereto submit to it. The court may also give an advisory opinion upon any dispute or question referred to it by the council or by the assembly.

Article Fifteen.

If there should arise between members of the league any dispute likely to lead to a rupture which is not submitted to arbitration as above the members of the league agree that they will submit the matter to the council.

Any party to the dispute may effect such submission by giving notice of the existence of the dispute to the secretary general, who will make all necessary arrangements for a full investigation and consideration thereof. For this purpose the parties to the dispute will communicate to the secretary general, as promptly as possible, statements of their case, all the relevant facts and papers, the council may forthwith direct the publication thereof.

The council shall endeavor to effect a settlement of any dispute, and if such efforts are successful a statement shall be made public giving such facts and explanations regarding the dispute, terms of settlement thereof, as the council may deem appropriate.

If the dispute is not thus settled, the council, either unanimously or by a majority vote,

shall make and publish a report containing a statement of the facts of the dispute and the recommendations which are deemed just and proper in regard thereto.

Any member of the league represented on the council may make public a statement of the facts of the dispute and of its conclusions regarding the same.

If a report by the council is unanimously agreed to by the members thereof other than the representatives of one or more of the parties to the dispute, the members of the league agree that they will not go to war with any party to the dispute which complies with recommendations of the report.

If the council fails to reach a report which is unanimously agreed to by the members thereof, other than the representatives of one or more of the parties to the dispute, the members of the league reserve to themselves the right to take such action as they shall consider necessary for the maintenance of right and justice.

If the dispute between the parties is claimed by one of them, and is found by the council, to arise out of a matter which by international law is solely within the domestic jurisdiction of that party, the council shall so report and shall make no recommendation as to its settlement.

The council may in any case under this article refer the dispute to the assembly. The dispute shall be so referred at the request of either party to the dispute, provided that such request be made within fourteen days after the submission of the dispute to the council.

In any case referred to the assembly all the provisions of this article and of article 12, relating to the action and powers of the council, shall apply to the action and powers of the assembly, provided that a report made by the assembly, if concurred in by the representatives of those members of the league represented on the council and of a majority of the other members of the league, exclusive in each case of the representatives of the parties to the dispute, shall have the same force as a report by the council concurred in by all the members thereof other than the representatives of one or more of the parties to the dispute.

Article Sixteen.

Should any member of the league resort to war in disregard of its covenants under articles twelve, thirteen, or fifteen, it shall, ipso facto, be deemed to have committed an act of war against all other members of the league, which hereby undertake immediately to subject it to the severance of all trade or financial relations, the prohibition of all intercourse between their nationals and the nationals of the covenant breaking state and the prevention of all financial, commercial, or personal intercourse between the nationals of the covenant breaking state and the nationals of any other state, whether a member of the league or not.

It shall be the duty of the council in such case to recommend to the several governments concerned what effective military or

naval forces the members of the league shall severally contribute to the armaments of forces to be used to protect the covenants of the league

The members of the league agree, further, that they will mutually support one another in the financial and economic measures which are taken under this article, in order to minimize the loss and inconvenience resulting from the above measures, and that they will mutually support one another in resisting any special measures aimed at one of their number by the covenant-breaking state, and that they will take the necessary steps to afford passage through their territory to the forces of any of the members of the league which are co-operating to protect the covenants of the league

Any member of the league which has violated any covenant of the league may be declared to be no longer a member of the league by a vote of the council concurred in by the representatives of all the other members of the league represented thereon

Article Seventeen.

In the event of a dispute between a member of the league and a state which is not a member of the league, or between states not members of the league, the state or states not members of the league shall be invited to accept the obligations of membership in the league for the purposes of such dispute, upon such conditions as the council may deem just. If such invitation is accepted, the provisions of articles twelve to sixteen inclusive shall be applied with such modifications as may be deemed necessary by the council

Upon such invitation being given, the council shall immediately institute an inquiry into the circumstances of the dispute and recommend such action as may seem best and most effectual in the circumstances

If a state so invited shall refuse to accept the obligations of membership in the league for the purposes of such dispute, and shall resort to war against a member of the league, the provisions of article sixteen shall be applicable as against the state taking such action

If both parties to the dispute, when so invited, refuse to accept the obligations of membership in the league for the purposes of such dispute, the council may take such measures and make such recommendations as will prevent hostilities and will result in the settlement of the dispute

Article Eighteen.

Every convention or international engagement entered into henceforward by any member of the league, shall be forthwith registered with the secretariat and shall, as soon as possible be published by it. No such treaty or international engagement shall be binding until so registered

Article Nineteen.

The assembly may from time to time advise the reconsideration by members of the league of treaties which have become inapplicable, and the consideration of international condi-

tions whose continuance might endanger the peace of the world

Article Twenty.

The members of the league severally agree that this covenant is accepted as abrogating all obligations or understandings inter se which are inconsistent with the terms thereof, and solemnly undertake that they will not hereafter enter into any engagements inconsistent with the terms thereof

In case members of the league shall, before becoming a member of the league, have undertaken any obligations inconsistent with the terms of this covenant, it shall be the duty of such member to take immediate steps to procure its release from such obligations

Article Twenty-One.

Nothing in this covenant shall be deemed to affect the validity of international engagements, such as treaties of arbitration or regional understandings like the Monroe doctrine for securing the maintenance of peace

Article Twenty-Two.

To those colonies and territories which, as a consequence of the late war, have ceased to be under the sovereignty of the states which formerly governed them and which are inhabited by peoples not yet able to stand by themselves under the strenuous conditions of the modern world, there should be applied the principle that the well being and development of such peoples form a sacred trust of civilization and that securities for the performance of this trust should be embodied in this covenant

The best method of giving practicable effect to this principle is that the tutelage of such peoples be intrusted to advanced nations who, by reason of their resources, their experience or their geographical position, can best undertake this responsibility and who are willing to accept it, and that this tutelage should be exercised by them as mandatories on behalf of the league

The character of the mandate must differ according to the state of the development of the people, the geographical situation of the territory, its economic condition, and other similar circumstances

Certain communities formerly belonging to the Turkish empire have reached a stage of development where their existence, as independent nations, can be provisionally recognized subject to the rendering of administrative advice and assistance by a mandatory until such time as they are able to stand alone. The wishes of these communities must be a principal consideration in the selection of the mandatory peoples, especially those of central Africa, who are at such a stage that the mandatory must be responsible for the administration of the territory under conditions which will guarantee freedom of conscience or religion subject only to the maintenance of public order and morals, the prohibition of abuses, such as the slave trade, the arms traffic, and the liquor traffic and the prevention of the establishment of fortifications or

military and naval bases and of military training of the nations for other than police purposes and the defense of territory, and will also secure equal opportunities for the trade and commerce of other members of the league.

There are territories, such as Southwest Africa and certain of the South Pacific Islands, which, owing to the sparseness of their population or their small size or their remoteness from the centers of civilization or their geographical contiguity to the territory of the mandatory and other circumstances can be best administered under the laws of the mandatory as integral portions of its territory, subject to the safeguards above mentioned in the interests of the indigenous population. In every case of mandate, the mandatory shall render to the council an annual report in reference to the territory committee to its charge.

The degree of authority, control, or administration to be exercised by the mandatory shall, if not previously agreed upon by the members of the league, be explicitly defined in each case by the council.

A permanent commission shall be constituted to receive and examine the annual reports of the mandatory and to advise the council on all matters relating to observance of the mandates.

Article Twenty-Three

Subject to and in accordance with the provisions of international conventions existing or hereafter to be agreed upon, members of the league [?] will endeavor to secure and maintain fair and humane conditions of labor for men, women and children, both in their own countries and in all countries to which their commercial and industrial relations extend, and for that purpose will establish and maintain the necessary international organizations.

[b] Undertake to secure just treatment of the native inhabitants of territories under their control.

[c] Will intrust the league with the general supervision over the execution of agreements with regard to the traffic in women and children and the traffic in opium and other dangerous drugs.

[d] Will intrust the league with the general supervision of the trade in arms and ammunition with the countries in which the control of this traffic is necessary in the common interest.

[e] Will make provision to secure and maintain freedom of communication and of transit and equitable treatment for the commerce of all members of the league. In this connection the special necessities of the regions devastated during the war of 1914-1918 shall be in mind.

[f] Will endeavor to take steps in matters of international concern for the prevention and control of disease.

Article Twenty-Four.

There shall be placed under the direction of the league all international bureaus already established by general treaties if the parties to such treaties consent. All such interna-

tional bureaus and all commissions for the regulation of matters of international interest hereafter constituted shall be placed under the direction of the league.

In all matters of international interest which are regulated by general conventions, but which are not placed under the control of international bureaus or commissions, the secretariat of the league shall, subject to the consent of the council, and if desired by the parties collect and distribute all relevant information and shall render any other assistance which may be necessary or desirable.

The council may include as part of the expenses of the secretariat the expenses of any bureau or commission which is placed under the direction of the league.

Article Twenty-Five.

The members of the league agree to encourage and promote the establishment and co-operation of duly authorized voluntary national Red Cross organizations having as purposes improvement of health, the prevention of disease, and mitigation of suffering throughout the world.

Article Twenty-Six

Amendments to this covenant will take effect when ratified by the members of the league whose representatives compose the council and by a majority of the members of the league whose representatives compose the assembly.

Such amendment shall (the word not apparently omitted in cable transmission) bind any member of the league which signifies its dissent therefrom, but in that case it shall cease to be a member of the league.

Those Which Sign

One—Original members of the league of nations. Signatories of the treaty of peace.

United States of America, Belgium, Bolivia, Brazil, British Empire, Canada, Australia, South Africa, New South Wales, India, China, Cuba, Czechoslovakia, Ecuador, France, Greece, Guatemala, Haiti, Hedjaz, Honduras, Italy, Japan, Liberia, Nicaragua, Panama, Peru, Poland, Portugal, Roumania, Serbia, Slam, Uruguay.

States invited to accede to the covenant: Argentine Republic, Chile, Colombia, Denmark, Netherlands, Norway, Paraguay, Persia, Salvador, Spain, Sweden, Switzerland, Venezuela.

Two—First secretary general of the league of nations, Sir Eric Drummond, of Great Britain.

The secretary general was allowed a salary of \$25,000 per year. The first general meeting was held in Paris, late in 1919, but the permanent headquarters of the League are located at Geneva, where permanent buildings have been erected for its accommodation. See WORLD WAR, VERSAILLES, TREATY OF

NAT TURNER INSURRECTION. See TURNER, NAT.

NATURAL, in music, a sign (\natural), which, if placed before a note counteracts the effect of a sharp (\sharp) or a flat (\flat) and restores the affected note to its normal tone See **MUSIC**.

NATURAL BRIDGE, a bridge formed by the wearing away of soft rock underneath harder rock, thus leaving an arch. A famous natural curiosity of this sort is the Natural Bridge across Cedar Creek, Va., about



NATURAL BRIDGE, VIRGINIA

125 miles west of Richmond. The sides are nearly perpendicular, the arch is 215 feet high and from fifty to one hundred feet wide, with a span, in its broadest part, of ninety feet. Three natural bridges have been discovered recently in Utah, each being larger than the one in Virginia. The Augusta Bridge in Utah is the largest in the world.

NATURAL HISTORY, in its widest sense, that department of knowledge which comprises the sciences of zoology and botany, chemistry, physics, geology, palaeontology and mineralogy. The term is most frequently used to denote collectively the sciences of botany and zoology, and it is sometimes restricted to the latter.

NATURALISM, *na'ture al'iz'm*, a philosophical term which indicates various debatable principles of the universe on the theory that nature furnishes a satisfactory explanation of all questions concerning them. The underlying type of most philosophies is *theism*, or belief in one superhuman power or spiritual controller of the universe. Naturalism opposes this view and declares other explanations must be sought.



NATURALIZATION, the process whereby a person renounces allegiance to the land of his birth and becomes a citizen of another country. Formerly many countries refused to recognize any act of naturalization as exempting the party naturalized from former allegiance. Thus the maxim of English common law, "Once an Englishman, always an Englishman," forbade a subject from adopting a new political status and rendered him liable to the penalties of treason, if found in arms against his native country. The existence of this principle gave rise to many disputes, more particularly between Great Britain and the United States, and it was not till the passage of the Naturalization Act of 1870, that its contention was formally abandoned by Britain.

When a person from another country becomes by naturalization a citizen of the United States he is invested with every political right of natural-born Americans except one—he cannot aspire to the Presidency of the United States.

Naturalization in the United States. In the following paragraphs are summarized the naturalization laws of the United States.

An alien may be admitted to citizenship in the following manner, and not otherwise:

1. He shall declare on oath before the clerk of the proper court at least two years before his admission and after he has reached the age of eighteen years, that it is bona fide his intention to become a citizen of the United States and to renounce allegiance to any foreign state or sovereignty.

2. Not less than two years nor more than seven after he has made such declaration he shall file a petition, signed by himself and verified, in which he shall state his name, place of residence, occupation, date and place of birth, place from which he emigrated, name of the vessel on which he arrived, the time when and the place and name of the court where he declared his intention of becoming a citizen, if he is married, he shall state the name of his wife, the country of her nativity and her place of residence at the time the petition is filed, and if he has children the name, date and place of birth and place of residence of each child living. The petition shall also set forth that he is not a disbeliever in or opposed to organized government or a member of any body of persons opposed to

organized government, and that he is not a polygamist or a believer in polygamy, that he intends to become a citizen of and to live permanently in the United States. The petition shall be verified by the affidavits of at least two credible witnesses who are citizens. At the time of the filing of the petition there shall be also filed a certificate from the department of commerce and labor stating the date, place and manner of his arrival in the United States and the declaration of intention of such petitioner, which certificate and declaration shall be attached to and be apart of his petition.

3 He shall, before he is admitted to citizenship, declare on oath in open court that he will support the Constitution of the United States, and that he absolutely renounces all allegiance to any foreign prince, potentate, state or sovereignty.

4 It shall be made apparent to the satisfaction of the court admitting any alien to citizenship that immediately preceding the date of his application he has resided continuously within the United States five years at least, and within the state or territory where such court is at the time held one year at least, and that during that time he has behaved as a man of good moral character, attached to the principles of the constitution. In addition to the oath of the applicant, the testimony of at least two witnesses, citizens of the United States, as to the facts of residence, moral character and attachment to the principles of the constitution shall be required.

5 He must renounce any hereditary title or order of nobility which he may possess.

6 When any alien who has declared his intention dies before he is actually naturalized the widow and minor children may, by complying with the other provisions of the act, be naturalized without making any declaration of intention.

Immediately after the filing of the petition, the clerk of the court shall give notice thereof by posting in a public place the name, nativity and residence of the alien, the date and place of his arrival in the United States and the date for the final hearing of his petition and the names of the witnesses whom the applicant expects to summon in his behalf. Petitions for naturalization may be filed at any time, but final action thereon shall be had only on stated days and in no case until at least ninety days have elapsed after the filing of the petition. No person shall be naturalized within thirty days preceding a general election.

No person who disbelieves in or who is opposed to organized government or who is a member of or affiliated with any organization entertaining and teaching such disbelief in or opposition to organized government shall be naturalized.

No alien shall hereafter be naturalized or admitted as a citizen of the United States who cannot speak the English language. This requirement does not apply to those physically unable to comply with it, or to those making

homestead entries upon the public lands of the United States.

Naturalization in Canada When a person seeks to become a citizen of Canada the act involves naturalization as a subject of the British Empire. Before seeking the privilege the candidate must have resided within the British Empire five years and in Canada one year. An alien woman who marries a British subject acquires British citizenship.

NATURAL SELECTION, a phrase frequently employed to indicate that process in nature by which those plants and animals best fitted for life under the conditions in which they are found, survive and spread, while others die out and disappear. Allowing for slight variations, each pair of plants or animals tends to produce more than two like themselves, and hence in time they would fill any locality with individuals requiring the same food and environment. In time, according to the theory, the locality becomes very much crowded and the weaker individuals are driven out in the so-called "struggle for existence," thus illustrating again the "survival of the fittest."

Of course, natural selection does not act suddenly, but operates noticeably only in a series of many generations. Moreover, it would not be possible were the individuals of each generation exactly like their predecessors. But children are never exactly like their parents, there are always variations which are intensified more or less by the surroundings. If natural selection acts at all, it is operative throughout the whole universe, from the lowest forms of animal life to man himself. Darwin first advanced this theory, which is not accepted by all scientists in every particular. See **HEREDITY, EVOLUTION**.

NATURAL THEOLOGY, a systematic arrangement of all the knowledge man possesses of the attributes and the being of the Creator. This knowledge is derived from consideration of nature and through philosophical study of all surrounding phenomena, and is the application of the principles of science to the assumption on which religion is based. Natural theology attempts to prove the existence of God through the contemplation of nature. Socrates, Aristotle and Plato taught the existence and the unity of God by means of the study of nature and human life. More modern philosophers assume that all existing phenomena reveal the character of the Being which organized the worlds.



NATURE STUDY. Of all the books that children may read and study there is none as fascinating or so comprehensive as the Book of Mother Nature. It presents to those whose eyes are open and whose senses are alert materials on all the natural sciences—botany, zoology, physiography, geology. It spreads before the observer flowers of every hue, and birds and insects in countless variety; it permits investigation of such marvels as the germination of plant life and the transformation of the crawling caterpillar into a gorgeous butterfly.

From that book the child learns at first hand—

"How the tortoise bears his shell,
How the woodchuck digs his cell,
And the ground-mole sinks his well,
How the robin feeds her young,
How the oriole's nest is hung,
Where the whitest lilies blow,
Where the freshest berries grow."

The inclusion of nature study among the regular school subjects is a comparatively modern step, but one which now has the endorsement of the majority of educators. Its purposes may be summarized as follows:

- (1) To train the child's powers of observation
- (2) To give him insight into the form, structure, characteristics and uses of all objects of nature, especially those belonging to the vegetable and animal kingdoms, with which he comes in daily contact
- (3) Through this acquaintance to lead the child to form a right attitude towards all objects which affect his life, to use all things economically, to prevent waste and destruction and to be kind to insects and animals
- (4) To lead the child to see the relations of various subjects to one another, as the relation of plant life to animal life and the dependence of occupations upon the geographical conditions of the locality in which he lives
- (5) To give the child the power to discover things for himself
- (6) To show the connection between the work of the school and the work of the home

Suggestions for the Teacher. With the exception of those children living in the congested portions of large cities, all children have some knowledge of the plant and ani-

mal life of their locality and of the different forms of water, as vapor, ice and snow, but their observation has not been systematic, and much of their knowledge is unclassified. The first work of the teacher is to train her pupils to habits of systematic observation. This may be accomplished by observing the following plan of procedure:

- (1) With young children, especially those in the first and second grades, study objects as wholes. If the object is a pansy, use the entire plant
- (2) Question skillfully, so as to direct the pupil's attention to the facts in the order in which they should be learned, so as to enable him to see the relation of these facts to one another.
- (3) Lead the pupil to discover for himself the facts which he should learn. He should not be told what he can learn from his own observation
- (4) Let each lesson depend as much as possible upon what has been learned in previous lessons
- (5) Secure from the pupils definite statements, in good English, of the facts they have learned
- (6) Lead the pupils to discover the uses of the objects studied
- (7) Keep the work within the capacity of the class. In the first three grades minute analysis of objects should not be attempted. Children in these grades easily grasp the relations of the large parts of an object, as the root, the stem, the leaves and the blossom of a plant, but they are not prepared for the study of the parts of these different organs. Besides, there is much more profitable work that they can do in these grades. The children of the third grade will enjoy studying attachments of seeds, by which they are scattered, and in spring, the germination of beans, peas, corn, squashes, pumpkins or other large seeds

The plan outlined above for primary grades constitutes the foundation of work in more advanced grades. The teacher should adhere to the principles here set forth and elaborate upon the plan as the needs of the class require.

Material. In the selection of material the teacher should be guided by the locality, the season and the conditions of her class. She should select the material with a view to reaching a definite end through the nature study work. In the autumn the preparation of plants and animals for winter is a theme which affords many interesting lessons, such as the withering and falling of the leaves, the ripening of fruit, the scattering of seeds, the migration of birds, the storing up of food by some animals and the burrowing by

others During winter the study of frost, ice and snow and the weather will furnish many lessons of interest to the younger pupils, while the older ones may be interested in studying the bark, wood and plan of branching of the different trees common to the locality In the spring, the awakening of life in the plant and animal kingdoms is of interest to all In rural schools the study of the life history of insects injurious to vegetation and of means for preventing their ravages is an interesting and profitable line of work. The ingenious teacher will find means to use profitably the abundance of material at her disposal

How to Use These Volumes. The makers of this set of books recognized the importance some phase of this subject assumes in most courses of reading and in every carefully outlined plan for general study The investigation of every phase of nature is quite naturally never attempted by any one person, yet some of its departments are constantly drawn upon by young people in many ways to furnish contributions to their classified knowledge Laterally hundreds of articles appear in alphabetical order in these volumes which in authoritative manner explain the facts of plant and animal life

Birds Children are interested in birds, and while they cannot classify the species and families, you, teacher or parent, will find such classification helpful in your work with the little people and useful in your own advanced study Without mentioning one of more than 200 birds discussed in these volumes, we give below their divisions, and one group can easily be studied without reference to any other

BIRDS	
Birds of Prey	Scratchers
Creepers	Sea Birds
Fishers	Swimmers
Perchers	Waders
Pigeons	Weak-footed
Runners	

Plants The wonders of nature are nowhere more strongly emphasized than in the study of plant life The subject is exceedingly broad; children are most interested in flowers, because attracted by beautiful forms and coloring, later they see other marvels in growing leaves and stalks, and the great diversity of plant life makes an appeal it is difficult to resist

This work contains articles on more than 600 specimens of plant life, and each is

described in its proper alphabetical order in the volumes The student, teacher or parent can quickly arrange a study plan based on any phase of plant life by examining the following table of sub-headings under which the hundreds of articles are appropriately grouped

PLANTS

Animal-eating	Herbs
Aquatic	Medicinal
Creepers	Mosses and Lichens
Desert Plants	Nuts
Diseases of	Parasitic
Dye Plants	Fruits
Ferns	Fungus
Fiber Plants	Garden Vegetables
Flowers	Grains
Forage	Grasses and Sedges
Parts of Plants	Spice-yielding
Plant Products	Trees
Seaweeds	Tropical
Shrubs	Weeds
Small Fruits	Unclassified

Insects It is a mistake to class all insects as injurious Many are pests, it is acknowledged, but this is untrue of some We often wonder what reason there can be for the existence of numerous species of insects, possibly we have not classed them as injurious, but at least we have maintained a strong prejudice against them This has been frequently brought to our attention when an investigator, studying insect life, has proved that some particular object of our disapproval is of great benefit to man, in one way or another For instance, we know that the ladybird, which is not a bird but an insect, protects vegetables from plant lice So far as we yet know, the world would be better off without our great variety of insect life, but we may learn in time that our present views must be greatly modified

Insects are very carefully described in these volumes in regular alphabetical arrangement The following list of sub-headings will assist the investigator in preparing material for nature study along this particular line:

INSECTS

Ants	Bugs
Bees	Butterflies and Moths
Beetles	Flies

Extending our investigations farther, we find that it will profit us, in seeking a well-rounded view of nature study, to refer to the general articles on Zoology, Botany, Insects, Birds, etc., not forgetting to study the colored illustrations showing orders of birds and animals

Wonder Questions in Nature Study

Why do the leaves drop off the trees in the fall?

During the spring and summer months the leaves are working hard manufacturing food for the trees, absorbing carbon dioxide, giving off oxygen, and sending in to the air surplus water which has circulated through the plant tissues. As winter approaches the food materials found in the leaves are absorbed by the branches and roots of the trees, to be stored away during the cold months. The leaf then withers, for its work is done, and across its base is formed a layer of hard cells. This marks the place where it breaks off. The fall of the leaf in northern regions is a wise provision of Nature, for during the cold months the root of a tree cannot absorb much soil water from the frozen earth, and if the broad-leaved trees kept their foliage the leaves would give off so much water the trees would dry up and die. Again, in the countries where there is a heavy snowfall, the branches, if covered with leaves, would be so laden with snow that they would suffer injury. Evergreen trees, which keep their leaves the year around, have long narrow leaves which cannot hold the snow.

What are the oldest living things in the world?

We have heard of certain animals living to be several hundred years old, but some of the "Big Trees" of California are older than any creatures alive today. The largest of these forest monarchs are probably 7,000 years old, and they are still flourishing, while the trees of average size have been growing for more than 2,000 years.

Why are some teas black and others green?

Black teas and green teas do not come from different varieties of the tea plant. The difference in color is the result of two methods of preparation. Black tea leaves undergo a sort of fermenting process. That is they are spread out until certain chemical changes take place that cause the black color. In preparation of green teas the leaves are placed in a firing machine soon after they are picked, which prevents fermentation by closing the pores. Oolong is a partially fermented tea which is black in color but has the flavor of green tea.

What are the silk and tassels on corn?

Each corn plant bears two kinds of flowers: those that produce stamens and those that produce pistils. The tassels are the staminate and the silk the pistillate

flowers. Tassels grow on the stalk and silk on the ear. There is always one silk for each kernel of corn, and there are about 800 kernels to an ear.

What causes a kernel of pop corn to "pop"?

The kernels on an ear of pop corn have a very hard, strong outer coat. When a kernel is shaken in a popper over a hot fire the heat transforms the moisture inside the kernel into steam. When this steam generates sufficient force it bursts open the kernel, which literally turns inside out with a popping sound.

How does a cricket sing?

The familiar sounds made by this insect are not produced by its mouth, as many people suppose, but by its wings. On the lower part of each forewing there are a number of little ridges which form a sort of rasp, or file, and on the inner margin of the wing there is a hardened portion which may be called the scraper. When the cricket wishes to "sing" he lifts up his forewings and moves them in such a way that the file on one wing rubs against the scraper on the other. This makes the wing membranes vibrate and produces the sound. Only the males are equipped with this musical apparatus.

Of what is the spider's web made?

The gauzy web of the spider is made of a sticky fluid that hardens into silk when exposed to the air. At the end of the spider's body there are three pairs of spinnerets, consisting of a number of small tubes that connect with glands in the abdomen. These glands secrete the sticky fluid. When the web is to be spun the spider lifts its spinnerets in the air, and by gently pressing them against some object makes the fluid run out in the form of fine threads, which harden in the air. Usually the spider spins a strand across the space where its web is to be hung, and then fastens other threads to the first one near the middle. These threads form the radiating spokes of the fairylke wheel which is to be a prison-house for many an unwary insect.

Where does the snail get its shell?

The snail makes its shell itself, for the hard covering is formed of a limy substance secreted by the skin of the little animal. Snails build their shell coverings in the same way that oysters and other mollusks do.

How do oysters eat?

To look at an oyster one would not sup-

pose that it had a mouth. It has, however, and this consists of a funnel-shaped opening at the narrowest part of the body. About the opening are a number of tiny projections which strain out from the sea water all sorts of plant and animal organisms, too small to be visible to the naked eye. A short gullet joins the mouth to a stomach. Digestion is also aided by a liver and a coiled intestine.

What tiny animals help to build islands?

These builders are minute, jellylike animals called polyps, which have the power to secrete a limy substance and build it around them like a shell. Anchored in the bed of the sea, millions of polyps working through countless years have built up colonies of shell formations which have finally projected above the sea level. This shell is known as coral, and is one of the most beautiful things in the ocean. It takes on lovely, flowerlike forms, and has many different colors. Polished, reddish-pink coral is used extensively to make necklaces, as everyone knows. The coral structures sometimes form broad banks, or reefs along the shores of continents, and sometimes they form rings in the water. The latter are called atolls. The Maldiv Islands, in the Indian Ocean, are atolls. There is a chain of coral reefs along the coast of Australia which is over 1,200 miles in length.

Where do pearls come from?

Pearls are made by pearl oysters, especially by a species found in tropical seas. On the inside of the oyster shell may be seen a hard, shiny substance of various colors. This is called mother-of-pearl, and is the inner layer of the limy substance which the oyster secretes to form its shell. Sometimes an object gets into the shell and irritates the oyster's soft body. The animal then secretes mother-of-pearl about the troublesome body and this forms a pearl.

How do fishes breathe?

Fishes breathe by means of gills, placed in the sides of the head. There are four pairs of gills, and they are made up of numerous tiny projections of skin, supported by bony arches. A current of water is kept constantly flowing over the gills as the fish alternately opens and shuts its mouth, and as the water circulates through them the gills extract oxygen from it. A fish brought to land has no means of getting oxygen, for the gills cannot extract it from the air. Therefore it dies of suffocation.

Where do the spots on bird's-eye maple come from?

Though birds-eye maple when polished is

a beautiful and expensive wood, the small round spots that are so prized are the result of injury to the bark. Usually when the bark is injured the trunk begins to sprout and soon sends out a number of weak little twigs. Each of these twigs becomes the center of a series of wood rings that give the wood its attractive markings.

What flower is used by tailors to raise nap on cloth?

Strange to say, no device has ever been invented which serves the tailor's purpose quite so well as the flower heads of the teasel. The flower heads are stiff enough to raise the nap, but if they meet an obstruction they will break off instead of tearing the material, as a metal device might do. The flower heads are cut in two and fastened to a cylinder which revolves against the cloth, the largest flowers being used for blankets, and the smallest ones for broadcloth.

Where does cork come from?

Cork is the outer layer of bark found on a small evergreen tree that grows in Spain and Portugal. It is composed of thickened walls of cells which have lost their living contents. Cork is cut from the tree in oblong strips, and if care is taken not to bruise the tree new layers form as long as the plant is in good condition. Raw cork is covered with a rough, woody layer, and before the substance is fit to be made into bottle stoppers, fish-net floats, etc., it has to be scraped and boiled.

Where do we get rubber?

Rubber is also the product of a tree, though it does not grow in the form in which we use it. The rubber tree is a warm-weather plant, and is found abundantly in the tropics. This tree yields a whitish juice, from which the rubber is extracted by evaporation of the liquid. The gatherer sticks a paddle into a pall of the juice and then holds the paddle over a smoldering fire. When the water evaporates a thin coating of rubber is left on the paddle, and after this process has been repeated several times enough rubber accumulates to be cut off and rolled into a ball. The crude rubber is then sent to factories, where it is put through various processes and made ready for the market.

Why does a dog turn around before lying down?

This habit is supposed to be an inherited one. In the days when all dogs were wild they used to trample down the grass to make a good place to rest in, and though our domestic dogs do not need to do this, they go through the same performance through instinct.

How does a chameleon change the color of its skin?

The outer skin of this interesting lizard is colorless, in the deeper layers of skin there are cells containing pigment, or coloring matter. When the creature is frightened and wishes to become inconspicuous it can change to the color of its surroundings by shifting the pigment grains toward or away from the outer skin. Usually it has a grass-green color, but it can assume various shades ranging from emerald to dark bronze.

What is the rattlesnake's rattler made of?

The rattle is a series of thin, horny rings, loosely attached to and overlapping one another. When the snake shakes them they produce the rattling sound. The rings are outgrowths of the skin at the end of the body. Each time the skin is shed a new ring forms, and so the oldest rings are the smallest, for they grow on the body of the young snake. Successive rings become gradually larger until the creature is full grown. Since the skin is shed several times a year, the age of a snake cannot be told by the number of rings.

What animal carries with it an electric battery?

There are several species of fish which have special organs capable of giving an electric shock. In South American waters there is found a long, snakelike eel which has an electric apparatus on the underside of the tail. With this organ the eel can stun an animal as large as a horse.

Why do dogs bark?

The barking of dogs is believed to be their attempt to talk to their human masters. It is a sort of imitation of human speech. This theory is held because wild animals that are most closely related to dogs do not bark. They yelp and howl, but they do not make the barking sounds of the domesticated dogs.

Do talking parrots have human intelligence?

No, these birds are clever at imitating the speech of human beings, but they are mere imitators. Probably the greater part of what they say has no meaning to them, though they may learn after a time that such expressions as, "Polly wants a cracker" will bring desired results. Parrots have only bird minds, no matter how cleverly they chatter.

How do deep-water fishes see?

Down deep in the ocean, where no sunlight ever penetrates, it is as dark as night, and

some of the fish in those depths are blind, because their eyes have de-generated or disappeared. Others, however, carry little lanterns with them, in the form of phosphorescent lights. The light-giving organs are on the sides of the body, either in the head or near the tail. Though these natural lanterns aid the fish in making their way about, they also reveal the whereabouts of their possessors to enemy fish. Hence they are not entirely an advantage.

How do seeds travel about?

The wind is the most important distributor of seeds. It is interesting to know that some seeds, such as those of the elm and maple trees, have little membranous flaps that serve as wings and permit the winds to blow the seeds long distances. Orchids and some other plants have seeds as fine as dust, which float readily in the air. Sometimes whole plants are blown about after the seeds are ripe, as is true of the tumbleweed. Another interesting growth is the pod of the poppy or morning glory, which is open at the top. When the stalk bends back and forth the seeds are flung out of the pod in all directions. Animals also help in seed dispersal, for the seeds stick in their fur and hair and are thus carried about. Birds are especially valuable as carriers of fruit seeds. These are some of the agents provided by nature that plant life may be kept distributed.

What plants steal their nourishment from other plants?

Plants which exist in this manner are called parasites. Good examples of these robbers are the mistletoe and the dodder. The mistletoe is an attractive evergreen shrub that twines about the trunks of such trees as the apple, hawthorn and sycamore. The dodder is less popular than the mistletoe, which does not really injure the host it lives upon. The dodder produces great tangled masses of threadlike stems, and is very destructive when it gets a good hold in a clover or alfalfa field. The destruction of this parasite is one of the many problems of the agriculturist.

Do plants ever store up food?

Yes, food is stored by all plants except those that live only one season. Trees go on living year after year, and in some cases century after century. If they did not store plant food in their roots during the winter, they could not put forth leaves and buds in the spring. Some of the food-storing plants are our most useful vegetables. The turnip and carrot, for example, store food the first year in their roots, and the second year, if allowed to mature, they use the stored food to build a tall stem that will bear flowers and seeds. Man

finds the roots of these plants a very good food, and he cultivates them for the purpose of eating them. Another food-storer, the onion, puts its foodstuffs in a bulb.

How does soil water get into the roots of plants?

As they reach down into the soil roots divide and subdivide into tiny branches called root hairs the walls of which are extremely thin. It is a law of nature that two liquids of unequal density separated by a thin membrane will mingle with each other. In the soil we have the water, and in the root hairs the denser sap of the plant. By a process called osmosis the soil water flows through the thin walls of the root hairs and mingles with the sap, for the flow is always toward the denser liquid. To provide sufficient moisture for plants a large extent of root hairs is necessary. Experiments show that 480 root hairs may be counted on each hundredth of an inch of root at the end of a corn plant.

What are the "eyes" of a potato?

These spots are stem buds. The edible part of a potato is not a thickened root, but an underground stem or tuber. When a piece of potato containing "eyes" is planted it will develop into a new plant.

How does the caterpillar change into a butterfly?

It seems strange that the crawling hairy worm we call a caterpillar could ever become the beautiful winged butterfly, but it is not so strange when we learn that when the caterpillar goes into its cocoon for the resting period it already has the beginnings of wings and butterfly legs. Just behind the head there are three pairs of tiny projections that become the feet and long legs of the butterfly, and if one of these is injured the developed insect will have an imperfect leg. The caterpillar also has a pair of folded buds that are to be the wings of the coming insect. During the caterpillar existence the creature eats and eats and eats, storing in its body food for the nourishment of the developing butterfly. After a time the caterpillar ceases to eat and envelopes itself in a hard, shiny case. In this it remains inactive for several weeks, but all the time its rudimentary wings and legs are developing, and it is being transformed into a flying creature. Finally the case splits open, and the perfect insect emerges. The butterfly looks small and forlorn when it first comes out, as its wings are closely folded against its body. In the air and sunshine, however, it soon becomes a lovely creature.

What causes milk to turn sour?

The souring of milk is a chemical change

resulting from the action of minute organisms called ferments, or bacteria. These are everywhere present in the air, and they are especially active in warm, moist places. That is why the milk turns sour if it is left standing on a warm day. If put in an ice box, where the temperature is low, it will remain sweet a much longer time. Sometimes you hear it said that thunder sours milk, but this is not true. People got this idea because it was noticed that milk often became sour on a day when there was a thunder shower. On such a day the air is usually warm and moist, and so this is a favorable time for the action of bacteria. The thunder itself has no effect on the milk.

What makes the bubbles in bread dough?

Yeast is a ferment, and when mixed with flour and water it changes the starch in the flour to sugar and then decomposes the sugar into carbon dioxide and alcohol. The bubbles in the dough form because the carbon dioxide, which is gas, rises up through the mixture. When the bread is baked the alcohol evaporates and the yeast germs are killed. Hence we cannot taste them.

How do insects breathe?

Insects do not have lungs, like mankind, nor gills, like fishes. Yet they have a very wonderful breathing apparatus. Along the sides of the body are openings called spiracles, through which air enters. These openings connect with a system of elastic tubes, which divide and subdivide throughout the insect's body, much like the veins in higher animals. These air tubes go to every part of the body, and they have such delicate walls that oxygen can pass out of them into the blood and purify it, as occurs in our own lungs. The air is circulated and renewed in the tubes by the regular swelling and contraction of the insect's body.

What insect is the most valuable to man?

Some may think that the bee, which makes honey and wax, should hold the place of honor, but there is another insect, the moth of the silkworm, which produces the fibers that form some of our loveliest and most costly fabrics. Probably an impartial jury would give the award to this industrious creature. Silk fiber is taken from the cocoon which the larva of the silk moth spins. These cocoons are plunged into scalding water, then floating threads of silk are caught by trained workers, and the fibers are wound on reels. Each cocoon consists of one long, very delicate thread, and a good many have to be twisted together to make thread strong enough to be woven into cloth.

In many of the articles will be found special type lessons. The general form of each may be used in connection with other lessons relating to different members of the same species, thus the value of the studies is particularly emphasized.

Books. There are scores of books on nature study, treating of both material and methods. Some of the best of these are Flagg's *A Year Among the Trees*, Newell's *Outlines of Botany*—Part I, *From Seed to Leaf*, Part II, *Flower and Fruit*; Dana's *How to Know the Wild Flowers*; Arnold's *Waymarks for Teachers*, Hale's *Little Flower People*, McMurry's *Special Method in Natural Science*, Ballard's *Among the Moths and Butterflies*, Burrough's *Birds, Bees and Bright Eyes*; Morley's *Insect Life*, Dugmore's *Bird Homes*, Flagg's *A Year with Birds*, Lange's *How to Know One Hundred Wild Birds of Illinois* (the same author also has similar books for Indiana, Missouri, Minnesota and Wisconsin), Olive Thorne Miller's *The First Book of Birds* and *The Second Book of Birds*.

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NATURE WORSHIP The religions of primitive peoples contain many elements of nature worship. The mysteries of nature, which early man could not comprehend, excited his awe and led not only to worship of the great elemental forces, such as fire, but of innumerable objects that inspired his admiration or wonder. Animal worship is very common in most primitive religions. In ancient Egypt several animals were held sacred, among them being the cat, the bull and the ibis. Snakes have been venerated at one time or another in nearly every land. They have been objects of special reverence in China. Of inanimate objects which have inspired man's awe and adoration are stones, worshiped by the early Lapps, Finns and by some African negroes, and certain trees, venerated in India, Australia, Peru and elsewhere. The celestial bodies were deified even by highly-civilized ancient communities.

The Persians, Egyptians and Babylonians worshiped the sun and moon. Sun worship has been prominent among the Hindus for ages, and was a conspicuous feature of the religion of the American Indian.

NAUSEA, *nau'she a*, or *nau'sha*, the sensation of sickness, or inclination to vomit, similar to that produced by the motion of a ship at sea. Though the feeling is referred to the stomach, it frequently originates in disorder of other parts of the body, such as the brain or kidneys, or may result from shock or sudden blows. Anyone who suffers from chronic attacks of nausea should consult a physician.

NAUTILUS, *nau'tilus*, a genus of animals, related to the cuttlefish. The pearly nautilus, an inhabitant of tropic seas, constructs a spiral shell resembling somewhat a snail's shell but differing from the latter in that the coil in its winding course is crossed by partitions, which divide it into innumerable compartments. As the animal increases in size, the spiral increases in width and as the nautilus outgrows its narrow quarters it seals them up behind it. The chambers are connected by a tube, through which they may be filled with air or water, and thus the nautilus is able to rise or sink. The animal which has been said to sail its shell upon the surface of the water, is the *paper nautilus*, or argonaut.

NAVAHO, or **NAVAJO**, *nah'va ho*, a tribe of Athapascan Indians who have been allotted a large reservation in Southwestern Utah, Northeastern Arizona and Northwestern New Mexico. About half of the Navahos live in this reserve, and the others are employed in white settlements in the vicinity or keep herds and flocks on the plains outside. These Indians are known especially for their skill in making blankets and rugs, which are woven from the wool of sheep. They number not far from 28,000.

NAVAL ACADEMY, UNITED STATES, a national school established at Annapolis, Md., in 1845, by act of Congress, for the purpose of giving instruction to young men who would become officers of the United States navy. Credit for the origin of the school is due to the historian, George Bancroft, who, when Secretary of the Navy, urged its establishment. In the course of the development of the institution it has become the largest and best-equipped naval school in the world. The students, formerly called cadets

are now known as midshipmen. The course of study covers four years, including two periods of two summer months, each of which is spent on naval ships at sea. Graduates first fill lower vacancies in the naval service, and occasionally in the Marine Corps. Promotions are not rapid, but are certain, in time, to all who show ability.

How Entrance Is Secured. In the following paragraphs the laws relating to admission to the Academy are summarized.

Appointments. Five midshipmen are allowed for each senator, representative and delegate in congress, also the Vice-President, five for the District of Columbia, fifteen each year from the United States at large and 100 from enlisted men of the navy. Five appointments from the District of Columbia, 15 each year at large and 100 from enlisted men of the navy are made by the President. One midshipman is allowed from Porto Rico, who must be a native of that island. Candidates must be residents of the district from which they are nominated.

Examination. Two examinations for the admission of midshipmen are held each year. The first is held on the third Wednesday in February, under supervision of the Civil Service Commission at certain specified points in each state and territory. All those qualifying mentally, who are entitled to appointment in order of nomination, will be notified by the superintendent of the Naval Academy when to report at the Academy for physical examination, and if physically qualified will be appointed. The second and last examination is held on the third Wednesday in April at Annapolis. Alternates are given the privilege of reporting for mental examination at the same time as the principals. Examination papers are prepared at the Academy and the examinations of candidates are finally passed upon by the academic board. Certificates from colleges and high schools will not be accepted in lieu of the entrance examinations.

Mental Requirements. Candidates will be examined in punctuation spelling, arithmetic, geography, English composition, United States history, ancient history, algebra, physics, and plane geometry.

Physical Requirements. All candidates must, at the time of their examination for admission, be between the ages of sixteen and twenty years. A candidate is eligible for appointment the day he becomes sixteen and is ineligible on the day he becomes twenty years of age. Candidates are required to be of good moral character, physically sound, well formed and of robust constitution. The height of candidates for admission must not be less than five feet two inches between the ages of sixteen and eighteen years, and not less than five feet four inches between the ages of eighteen and twenty years. The

minimum weight at sixteen years is 109 pounds, with an increase of five pounds of each additional year or fraction of a year over one-half. Candidates must be unmarried.

Pay. The pay of a midshipman is \$780 a year, beginning at the date of his admission. Midshipmen must supply themselves with clothing, books, etc., the total expense of which is nearly \$300.00. Traveling expenses to the Academy are paid by the government.

Enlistment. Each midshipman on admission is required to sign articles by which he binds himself to serve in the United States navy eight years (including his time of probation at the Naval Academy).

NAVAL MILITIA, citizens who are organized in a body which supplements the Naval Reserve (which see). Its members receive no pay, and are not obliged to serve on ships, although this experience is provided for all who wish it. The government loans small naval vessels periodically to the states soliciting them, for the purpose of drills. In times of stress the naval militia may be called into service. There was a naval militia in each of the following jurisdictions, all under the direction of an Assistant Secretary of the Navy, at the close of the year 1936:

Alabama	Minnesota
Connecticut	New Jersey
Florida	New York
Illinois	Ohio
Indiana	Wisconsin
Missouri	Virginia
Michigan	

NAVAL OBSERVATORY, *observato-*
ry, an astronomical observatory established at Washington, D. C., operated under the supervision of the bureau of equipment in the Navy Department. The buildings are on Georgetown Heights and comprise an office building and observatories for the various astronomical instruments used. Chief among these is the 26-inch equatorial telescope, which was placed in position in 1874 and was at that time the largest instrument of its kind in the world. There are also transit instruments, astronomical clocks, photoheliographs and various other pieces of intricate apparatus. The library contains 32,000 volumes and a large number of pamphlets. The work of the observatory consists largely in the following up discoveries that have been made in other observatories and making them practical. It also prepares the *Nautical Almanac* and issues numerous reports and articles pertaining to astronomical subjects.

NAVAL RESERVE, in the United States, put upon a permanent basis by act of Congress in 1915, is a body of men who have served in the navy for at least four years or who enlisted in the navy before becoming of age, and were honorably discharged. Members must hold themselves ready for a call to naval service in time of necessity. When so called they have the same status as the regularly-enlisted men of the navy

The naval reserve members are in two classes. The first includes those who enlist within four months of discharge, all others are in class two. The pay of class one members is \$30 per year, if their regular service in the navy was less than eight years, \$60, if service was from eight to twelve years, \$100, if over twelve years. Members of the second class receive \$12 per year. When called to service a clothing allowance is made, and regular naval pay is given. Enlistment in the naval reserve is for four years.

NAVAL TRAINING STATION, GREAT LAKES, the largest station of its kind in the United States, located on the shore of Lake Michigan, thirty-three miles north of Chicago. It was established by act of Congress in 1904, the site, a tract 167 acres in extent, was donated by the Commercial Club of Chicago. In 1911 the station, which then consisted of twenty-three buildings, was officially opened by President Taft. Up to January 1, 1917, the normal complement was 1,600 men, the course of training was such as is usually given apprentice seamen, and covered a period of from four to six months.

The entrance of America into the World War caused an extraordinary expansion of the station. By the summer of 1918 it had spread over 1,200 acres and comprised 775 buildings, nine of them immense drill halls, each capable of accommodating a regiment of 1,726 men. The total number of men in training at one time was nearly 50,000, and during the entire war period 121,000 were received. Of these, 86,779 were transferred to sea, while the special schools, fifteen in number, graduated 17,356. A Great Lakes Band organized by John Philip Sousa had a complement of 1,500 musicians. In 1933, as a part of the program for national economy, the Great Lakes Station was reduced to the status of a reserve station, but was restored to regular status in 1935.

NAVARRÉ, *na vah'r*, an independent kingdom of Old Spain, lying on both sides of the Western Pyrenees Mountains. The territory included within its boundaries constitutes at present the Spanish province of Navarre, sometimes called Upper Navarre, and a portion of the French department of Basses-Pyrenees, or Lower Navarre. Modern Navarre has an area of 4,055 square miles and a population of 347,483. The capital is Pamplona. Ferdinand the Catholic annexed Upper Navarre to Castile in 1512, while the northern portion passed with Henry IV to the crown of France.

NAVARRO, *na vah'ro*, MADAME. See ANDERSON, MARIE ANTOINETTE.

NAVE, the middle or main division of a church interior, that part extending from the chancel to the entrance opposite. In Gothic architecture the nave is flanked by columns, and over it extend lofty arches, much higher than the ceiling over the side aisles. In churches that have an aisle crossing in front of the chancel, the nave is that part which extends from this aisle to the church rear.

NAVIGATION, the science of sailing vessels from one place to another, more especially the art of directing and measuring the course of ships and of determining their position by observation and computation. The direct management of the sails, the rudder, the engines and the working of the ship generally, though essential to navigation, is usually classed as seamanship. In order that a ship may be navigated successfully, it must not only be a perfect machine, but it must be supplied with accurate charts and plans of ports and harbors, with compasses, chronometer, sextant, log and the various mathematical instruments by which observations can be taken and computations made. It is by the compass that the direction which the ship sails or should sail is determined. Though the compass points in a northern direction, it does not always point to the true north, and its variation must be taken into account.

The rate of speed at which a vessel is sailing is found by the log, which is heaved usually at the end of every hour. The position of the ship may be obtained by noting the rate and direction of sailing and the distance which has been covered. But the more accurate way is by taking observation of the heavenly bodies with the sextant and comparing these with printed data, relying

upon the correct Greenwich time, which is given by the chronometer. The science of trigonometry is involved in navigation, but the operations can be much shortened by tables and instruments.

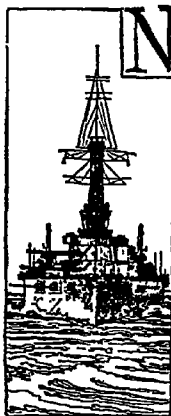
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 Dead Reckoning Sextant

NAVIGATION ACTS, a name given to acts passed by the British Parliament in 1645 and in years following in order to protect British commerce, to injure the shipping interests of the Dutch and to exploit the British colonies.

The First Navigation Act, passed in 1645, confirmed and enlarged in 1651 and again strengthened in 1660, enacted that all products of growth, production or manufacture from any country in the world should be imported into England only in ships built in England or in its colonies and manned by Englishmen. Another was passed in 1663, it levied prohibitive duties upon goods imported into the colonies from any but British ports and required that certain important products of the American colonies should be sent directly to England. A little later, duties were imposed upon goods shipped between colonies, if the same goods could be secured in England. Before the end of the century, acts directed at the suppression of colonial manufactures were passed, and in 1719 Parliament condemned all colonial manufactures as "tending to independence." Before 1761 at least twenty-nine separate acts in restraint of colonial trade and manufactures had been passed, including one prohibiting the importation of molasses and sugar, from which the Americans manufactured rum for export.

The full effect of this policy of suppression was never felt in America, owing to the practice of smuggling, which was considered by the colonists as legitimate, and which assumed immense proportions. Furthermore, many of the provisions of the acts were favorable to American industry, especially to shipbuilding, while certain privileges were extended to colonial producers which were denied to all others. However, the principle of restriction of trade and manufactures was vigorously denounced by the Americans, and the persistence of the British in this policy was one of the important causes of the Revolution.

Great Britain long ago abandoned such a policy towards its colonies, just before the World War (1914-1919) Germany, which insisted upon "freedom of the seas," was selling its goods in British ports all over the world cheaper than English merchants could sell them.



NAVY, an arm of government, an instrument of law and order, properly a policeman of the seas. The term is applied to all the ships of war of a nation, including their crews, guns and fittings. The world's conception of the uses of a navy has radically changed with the development of society. Once it was an institution devoted wholly to enforcing peace, but now it would be difficult to convince the average man that it is not wholly an implement of war. There are two reasons for the latter view. Men as a rule do not read history correctly, and they are apt to draw conclusions from offending examples and apply those conclusions to all.

There is a belief that the possession of a large and powerful navy is a temptation to use it aggressively, for conquest. This was charged against Germany at the outbreak of the World War. On the other hand, the navy of Great Britain was much stronger in 1914 than any other two navies in the world (it has now surrendered that distinction), but since the English have learned from their failures the art of good government the British fleet has not been an instrument which right-thinking peoples have had cause to fear.

The British have been masters of the seas for a hundred years, everybody admits, but there is no record in all that time of abuse of the power thus held. England has believed in and has practiced free trade, but ships of all countries have swarmed in harbors owned by Great Britain, and there has been no limit upon peaceful development of commerce by competing nations. Even Germany, which plaintively cried for "a place in the sun" for years before the World War, was all the time underselling British merchants in British lands all over the world.

The Legitimate Demand for Navies Commercial nations in early days suffered from depredations of piratical crews which sailed the seas to rob merchantmen, wherever found. It became necessary to send vessels armed with guns to protect merchant vessels from such robbers. Here navies had their beginning, they were built to preserve the peace and to make the seas safe for legitimate commerce. As shipping increased in volume the number of protecting vessels increased. In time national ambitions led to strengthening these protecting vessels, and ships with many guns appeared. With this development of strong sea forces navies became important elements in war, and no war was projected without due consideration of the assistance which could be rendered by them.

When the *Monitor and Merrimac* battle in 1862 developed the iron-clad vessel, the serious business of building modern competitive navies was begun, though the pirates of old had disappeared from the seas, and commerce-laden vessels found the ocean lanes everywhere safe. The theory persisted that were war vessels to disappear the highwaymen of the seas might reappear, and there is truth in the assertion, even to-day, but precaution in that respect has not been the moving impulse in naval development. It has been due to national distrust, in the main, although self-protection has also been a motive. Since naval vessels have become so important a part of modern warfare, the great nations have considered it necessary to build navies large enough to maintain their interests on the seas against all the powers of a possible adversary.

How Power Is Divided The greatest maritime nation is Great Britain. Theoretically, therefore, that empire should have the world's largest navy, that it may not fail in its duty to watch over possessions extending to the remotest corners of the earth. The supremacy of British sea-power was maintained for generations, but this primacy was surrendered in the interests of world peace in 1921, at the Washington Conference. This conference was called by President Harding to effect reduction of arms and to stop competitive naval building. As a result of that meeting, it was agreed that the navies of Great Britain and the United States should for fifteen years be of equal strength (tonnage), and that Japan's navy should be

three-fifths as strong. These proportions are indicated by the figures 5-5-3. France and Italy agreed to equal naval tonnage below that of the three powers named, the five-power strength being denoted by the proportion 5-5-3-1-66-1-66. The actual tonnage to be permitted each nation in the Five-Power Treaty signed at the time was as follows: United States, 525,000, Great Britain, 525,000, Japan, 315,000, France, 175,000, Italy, 175,000.

Germany had a navy about half as strong as that of Great Britain at the beginning of the World War, their numbers of ships were 545 and 304, respectively, their tonnage, 2,714,106 and 1,306,577. From the war Germany emerged without a navy, for nearly all of its naval vessels, to the number of more than seventy that had escaped destruction in the Battle of Jutland (May 31, 1916), were surrendered to the Allies under the terms of the Treaty of Versailles.

Under the Nazi government headed by Adolph Hitler nearly fifteen years later, that dictator declared his intention to abrogate such parts of the treaty as affected national defense, and notified the world that he would rebuild the German army and navy, regardless of the attitude of the former Allied nations. Europe was thoroughly alarmed, but Great Britain reached an agreement with the German government whereby the latter should limit its contemplated naval construction to thirty-five per cent of the tonnage allotted to the British nation. France protested this arrangement, because of its traditional feeling of national insecurity in all things affecting relations with Germany, and because it would assure Germany a navy practically equal in tonnage with its own, but the agreement was not modified, to the manifest discomfort of France.

Kinds of War Vessels Following is a brief statement of the principal classes of warships, the names given being those popularly applied to each class.

Superdreadnaught, the largest warship built, slightly heavier and more powerful than the dreadnaught. It is likely to have 16-inch guns.

Dreadnaught (meaning a fearless person) was the most powerful battleship until the advent of the superdreadnaught. Vessels of these two classes are over 500 feet long and have a displacement of at least 26,000 to 32,000 tons. Their guns are of the heaviest caliber (not less than 14 inches) and the longest range—over twenty miles.

First-Class Battleships, a division which of course includes the two superclasses. These vessels have a displacement above 15,000 tons, with armor as heavy as the dreadnaughts and guns whose range varies from twelve to twenty miles. These vessels are slow in movement, for their best speed is from eighteen to twenty-two miles per hour, but they are powerful in action. The caliber of the guns is 8 and 10 inches.

Armored Cruisers, speedier than battleships, in many instances as large, and frequently as heavily armed. The displacement is from 9,000 to 14,000 tons, their speed, not far from twenty-five miles per hour. Their armor is heavy. The caliber of the guns is usually 10, 8 and 6 inches, but larger guns are in prospect.

Protected Cruisers, vessels with light armor plate, in length from 300 to 400 feet, and with a displacement of 3,200 to 8,000 or 9,000 tons. Their speed is nearly that of the armored cruisers. Calibers of guns is 8, 6 and 5 inches.

Other Vessels. The naval equipment also includes small cruisers for scout service, torpedo boats and destroyers, submarines and gunboats. Large and powerful airplane carriers are recent additions to the service.

In the United States. The history of the United States Navy is one of progressive development from the "White Fleet" of the latter part of the nineteenth century to the large and efficient navy with which the nation entered the World War in 1917. At that time the Navy had several superdreadnaughts of over 30,000 tons, and a large force of battleships, cruisers, destroyers, and other craft. The total tonnage of the American fleet then was 894,889, slightly below that of France. After the war demands for a larger navy started an ambitious program of construction, which was halted when President Harding called the limitation of arms conference of the powers to meet in Washington in 1921. The results of that meeting have already been described in this article. To bring the agreed future tonnage of the United States to 525,000, nearly 400,000 tons of fairly effective and a large number of obsolete ships had to be destroyed. New vessels in process of construction at the time were junked.

The United States in 1936, at the expiration of the fifteen-year limitation of construction imposed by the Five-Power Treaty, possessed fifteen battleships, the newest of which, the *West Virginia*, was commissioned in 1923, the oldest, the *Arkansas*, dates from 1912. Heavy cruisers in commission numbered fourteen, light cruisers, ten, aircraft carriers, four, submarines, fifty-four, destroyers,

seventy-two, mine-sweepers, twenty-nine, submarine chasers, seventeen, and auxiliary small craft to the number of about one hundred. The Congress of 1935 approved an ambitious building program, to result in a few years in greatly augmented strength.

The President of the United States is the commander-in-chief of the navy, he acts through the Secretary of the Navy. Under the naval establishment are many institutions for the education and training of officers. The United States Naval Academy, at Annapolis, is a school for officers. There are four naval training stations, the one at Great Lakes, Ill., being the largest in the world, capable of housing 40,000 future seamen at one time.

Related Articles. Consult the following titles for additional information:

Admiral	Privateer
Blockade	Rank in Army and Navy
Gunboat	Submarine
Marine Corps	Submarine Mine
Naval Academy	Torpedo
Naval Militia	Torpedo Boat
Naval Reserve	Warship
Navy, Department of the	World War

NAVY, DEPARTMENT OF THE, one of the executive departments of all maritime nations. In the United States the office is in direct charge of the Secretary of the Navy, a member of the Cabinet of the President and responsible to that official, who is commander-in-chief of the navy. The Secretary performs such duties as the President assigns to him, and has general supervision of construction, manning, armament, equipment and employment of vessels. The salary of the Secretary is \$15,000 per year. See CABINET.

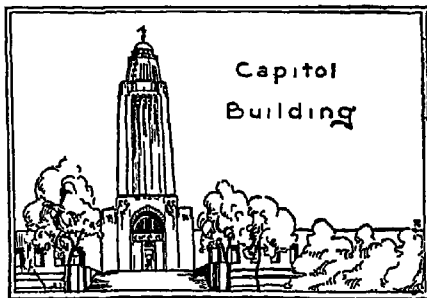
NAZARETH, a small town in Palestine about seventeen miles southeast of Acre, famous as the residence of Jesus during the greater part of his life on earth. It is beautifully situated among hills dotted with fig trees, olive trees and cypresses. The houses, flat-roofed, are built mostly of limestone. The convent of the Annunciation, built by the Franciscans in 1620, is said to mark the site of Mary's dwelling, but the only uncontestedly unchanged and identifiable Biblical site is the Virgin's Spring. The population, made up of Moslems, Orthodox Greeks, United Greeks, Catholics, Maronites and Protestants, numbers about 11,000.

NAZI-ISM, *naht zio izm*, the name of the system of political and social beliefs adhered to by the National Socialist

party of Germany. It is also called *Nazism*. The creed of the party is based on the theory of Fascism, as developed in Italy, though it is less restrained in its operation.

The National Socialists were organized from humble beginnings by Adolf Hitler before 1930. The German people had never ceased being resentful of the humiliation imposed by the treaty which ended the World War. Hitler, an Austrian who had served in the war in the German army, fanned this emotional and patriotic feeling into a blaze, he promised abrogation of such parts of the treaty as were repugnant to German conception of right, and his program within three years won to him a majority of the people. He became Chancellor (Premier) in the Cabinet, and on the death of President Hindenburg in 1934 assumed also the duties of the Presidency, refusing the title, however, and calling himself *Der Fuehrer* (the leader).

Nazism glorifies the State, the individual must live in conformity to the mandate of the National Socialist party and the will of *Der Fuehrer*. According to the Nazi ritual, Germany must be wholly an Aryan nation, therefore there is no place in the Reich for Jews, religious belief may be a secret in the heart of the individual, but must not find group expression—churches are under a ban. The right of free speech and free assembly is denied the people, who dare not utter opinions critical of the existing order, a prison sentence is the penalty for disobedience of this mandate. Hitler is the dominating force in the government, he is the absolute head of the National Socialists, the only political party in Germany, all others having been forcibly disbanded. An election in Germany, therefore, expresses only the Nazi viewpoint.



NEBRASKA, one of the central states of the American Union. It is popularly called the **TREE PLANTERS' STATE** because J. Ster-

ling Morton, a Nebraskan and a former United States Secretary of Agriculture, instituted Arbor Day to supply trees to the state's barren prairies. Arbor Day is now observed by many other states.

Just south of Nebraska is Kansas, which is in the exact geographic center of the United States. South Dakota and the Missouri River are on the north, the same river extends entirely along the eastern boundary separating the state from Iowa and Missouri, Colorado and Wyoming are on the west. The area of Nebraska is 77,520 square miles, making it fifteenth among the states in size. The state flower is the goldenrod.

Population. In 1920 the population of Nebraska was 1,296,372. By the census of 1930, its population had grown to 1,377,963, giving it the rank of thirty-second among the states, with a density of 17.9 to the square mile. It has eight cities each with a population of over 10,000. Omaha (214,006) is the largest city, Lincoln (75,933), the state capital, is second in size. No other city in 1930 had 20,000 people. Those next in size were Grand Island, Hastings, North Platte, Fremont, Norfolk and Beatrice. Nebraska's most famous citizens have been J. Sterling Morton, William Jennings Bryan and John J. Pershing.

Surface and Drainage. Nebraska forms a section of the eastern slope of the great plains, and rises, at an average of about ten feet to the mile, from an elevation of 850 feet, at the southeastern corner, to more than 5,000 feet, on the western boundary, where the foothills of the Rocky Mountains begin. The highest point in the state is Hogback Mountain, 5,084 feet, in Banner County, which adjoins Colorado, the average elevation is about 2,500 feet. The surface is rolling prairie, through which rivers have worn wide channels. Along the Missouri and the North Platte are numerous high bluffs, and in the northwestern corner is found a section of the Bad Lands, or Pierre Shale Hills, which occupy a larger area in South Dakota. These lands consist of bluffs that have been fantastically worn by wind and water into many curious and interesting shapes. They constitute one of the richest fossil regions of the world.

The state is drained directly or indirectly into the Missouri. A height of land, extending irregularly from the eastern to the western boundary through the northern tier of

counties, separates the streams that flow into the Missouri to the north from those that flow into the Platte. The Niobrara, flowing eastward along the northern part of the state, with its short, spring-fed tributaries, forms one of the most picturesque regions of the continent, there are in its basin near Valentine fifteen beautiful waterfalls, the highest of which are the Arikaree and the Pary, each with a precipice of ninety feet.

The Platte, formed by the North Platte, which enters the state near the middle point of the western boundary, and the South Platte, which enters it from Colorado, flows across the southern and central parts to the Missouri. Its principal tributary from the north is the Loup, which receives the South Fork Loup, the Middle Loup and the North Fork Loup and drains a large portion of the central and southern part. The Elkhorn enters the Platte from the north, a few miles before it reaches the Missouri. The Republican River flows through the southern tier of counties, from west to east, about three-fourths of the distance across the state, and then enters Kansas, the south-eastern counties are drained by the two Nemahas and their tributaries, flowing into the Missouri. A number of lakes are found in Holt, Brown and Cherry counties.

Climate. The climate is warm-temperate, and is characterized by sudden changes common to inland regions. On the whole it is agreeable, exhilarating and healthful. The atmosphere is dry, and gentle winds prevail. The mean temperature is about 21° for January, and 74° for July, but the thermometer sometimes falls in winter as low as 25° below zero and rises as high as 100° during the hottest months. The nights, however, are cool, and because of the dryness of the atmosphere the extremes of heat and cold are not felt as they are in a humid climate.

The rainfall averages about twenty-four inches, being over thirty inches in the eastern part and from fifteen to twenty inches in the western counties. In respect to rainfall, the state is divided into three regions: the eastern, which receives an abundance of rain, the central, receiving usually enough for agriculture, and the western, which is semiarid and requires irrigation. About 28 per cent of the tillable land in Nebraska is irrigated.

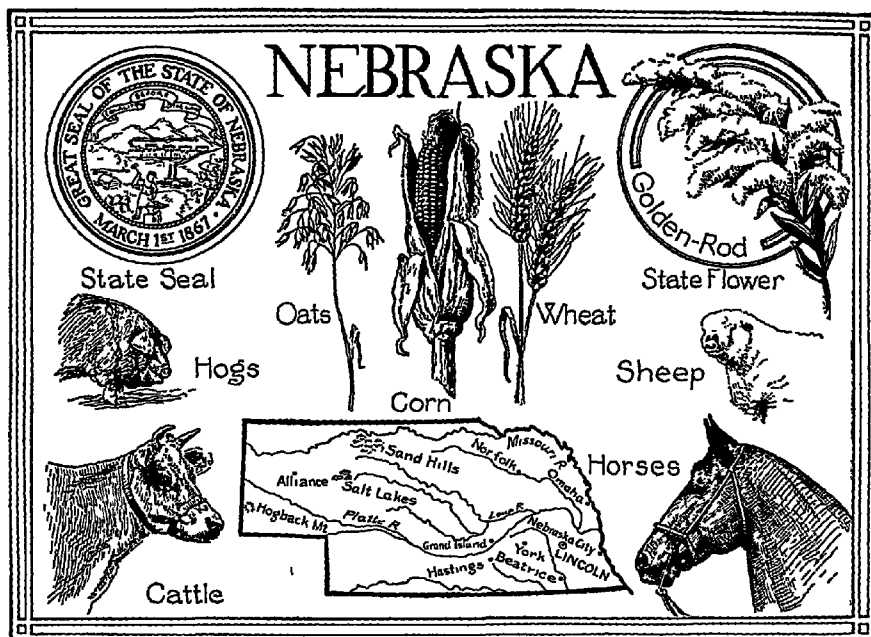
Mineral Resources. The minerals are few,

but the output is worth annually about \$3,300,000. Building stone is found in most parts of the state, there are some 200 limestone quarries in operation. A high grade cement rock is also generally distributed. As there are many clay deposits the brick and tile industry is important. In the south central counties there are also deposits of ochre, most of America's pumice stone is found in the state. Nebraska at one time produced about one-third of the potash of America from the waters of lakes in the sand hill region of the state.

Agriculture. With the exception of limited areas in the northwestern and western areas, the entire state is covered with good soil, consisting of loam mixed with sand underlaid by a porous layer of sand or gravel. Corn is the leading crop and occupies nearly one-half of the acreage under cultivation, the value of the crop each year is \$70,000,000 or more. Wheat, oats and alfalfa follow in order of importance. Sugar beets are raised in large quantities, and Nebraska is one of the important states in the production of beet sugar. Stock raising is practiced throughout the state, though it receives relatively greater attention in the western part, where the natural grasses mature and support live stock through the winter with little or no additional feed. Large numbers of horses and mules are raised for market, and cattle, hogs and sheep are fattened for slaughter. Dairy husbandry also is an important branch of agriculture.

Manufactures. Nebraska is not a manufacturing state, though certain industries have received considerable attention. Chief among these is slaughtering and meat packing, the center of which is at Omaha, which is the third city in importance in this industry in the Union. The second manufacturing industry of importance is the making of flour and other grist mill products. Large quantities of starch are made, and there are numerous factories for canning fruits and vegetables and for the manufacture of beet sugar. The making of butter and cheese also receives considerable attention.

Transportation and Commerce. The state is well provided with railroad transportation facilities. Three important railroads—the Chicago & North Western, the Chicago, Burlington & Quincy and the Union Pacific—cross the state from east to west. The state has about 6,235 miles of railways and over



Items of Interest on Nebraska

The valleys of the great streams are huge shallow troughs the valley of the North Platte in the foothills, once the flood-plain of a large river, is in places 700 feet below the table-land and ten to fifteen miles wide, the present flood-plain is one to four miles wide

The Missouri is noteworthy for the high bluffs, cut by ravines, which border it almost continuously on one side

Many springs of considerable size are found in the foothills, artesian wells and a practically inexhaustible supply of ground water are found in nearly all parts of the state

The Bad Lands are famous fossil fields Nebraska has fully 3,300 species of trees, shrubs and grasses, "representing every branch and nearly every class of the vegetable kingdom"

The state has nearly one-half million children of school age, the annual expenditure for schools is about \$21,000,000.

Questions on Nebraska

What are the main physical divisions of Nebraska?

What is the characteristic form of the valleys of the great rivers?

What day, now observed in nearly all states, was first observed in Nebraska?

What can you say of the variety of vegetation?

How does the state rank in value of farm products?

What is the most important crop?

What part of the total crop value does it represent?

Name the four leading manufacturing industries

Of what mineral has Nebraska practically a monopoly?

What are the most important manufactures of Omaha? What per cent of the entire product of the state is furnished by Omaha?

190 miles of electric lines The Missouri is navigable but the construction of railways has rendered it of little use as a waterway. Nebraska is crossed east and west by the Detroit-Lincoln-Denver and by the Lincoln highways North and south traffic uses the Cornhusker, the Kansas City-Omaha and the Meridian highways, the Oregon Trail and the Yellowstone Park Highway Sixteen important bus lines operate in the state. Twenty-two airports have been established

Education. Illiterates are few—1 person out of \$7 among those ten years of age and over The school fund is obtained from the interest on the money provided by the sale of public lands, from a state tax, from fines, from forfeitures and from the local tax The state university at Lincoln is at the head of the school system The four state teachers colleges are at Peru, Kearney, Wayne and Chadron Besides these several important secondary schools and colleges are supported by various denominations such as Dana College at Blair, University of Omaha at Omaha, Creighton University at Omaha, Doane College at Crete, Midland College at Fremont, Hastings College at Hastings, Nebraska Wesleyan University at University Place, Union College at College View, and York College at York There are five junior colleges in the state

Other Institutions Since 1912 the state institutions have been in charge of a state board of control The school for the deaf and dumb is at Omaha, that for the blind is at Nebraska City, and the institute for the feeble-minded is at Beatrice Hospitals for the insane are conducted at Lincoln, Norfolk and Ingleside. There are sailors' and soldiers' homes at Grand Island and Milford, a hospital for crippled and deformed children at Lincoln, a home for tuberculous patients and a home for dependent children The penal institutions consist of an industrial school for boys at Kearney, a girls' industrial school at Geneva, an industrial home for girls at Milford and the state penitentiary at Lincoln

Government The legislature elected in 1934 was the last one to comprise two houses All subsequent legislatures will consist only of a single house The legislature meets biennially, and the session is practically limited to sixty days, after the first twenty days no new bills may be introduced, unless by request of the governor in a special

message The executive department consists of a governor, lieutenant-governor, secretary of state, auditor, treasurer, superintendent of public instruction, attorney-general, commissioner of public lands and buildings, and three railway commissioners, each elected for two years The judicial department embraces a supreme court, district courts and county courts The supreme court comprises seven judges, elected by popular vote for six years Each county has a county judge, whose term is two years

History Nebraska was probably visited by Coronado as early as 1541 In 1673 the Platte and Missouri districts were mapped by Marquette The present Nebraska formed a part of the Louisiana Purchase of 1803, and in 1804-1805 it was visited by Lewis and Clark As early as 1825 white settlement was begun, the first towns being founded at Omaha and Nebraska City After a long struggle, in which slavery played an important part (see KANSAS-NEBRASKA BILL), Nebraska was established as a territory in 1854, including parts of Dakota, Montana, Wyoming and Colorado In 1863 it was reduced to its present limits

Nebraska became the thirty-seventh state on March 1, 1867, and Lincoln was made the capital in the same year The struggle for statehood was prolonged by differences between President Johnson and Congress over the state constitution

Since the organization of the Republican Party in Nebraska in 1858 control has swayed from Republicans to Democrats except during the period of Populist influence, 1894-1904 The Civil Administrative Code Act of 1919 combined the 25 administrative agencies of the state into six departments finance, labor, trade, agriculture, public works and public welfare Cities of more than 5,000 people are empowered to frame their own charters and all cities are permitted to employ city managers Aliens who have declared their intention to become citizens of the United States may vote

Related Articles Consult the following titles for additional information

CITIES		
Beatrice	Grand Island	Lincoln
Fremont	Hastings	Omaha
GENERAL		
Arbor Day	Missouri River	
Bryan, William Jennings	Morton, J Sterling	
Kansas-Nebraska Bill	Pershing, John Joseph	
Louisiana Purchase	Platte River	
	Potash	

NEBRASKA, UNIVERSITY OF, a coeducational state university, founded at Lincoln in 1869 and opened in 1871. The university comprises colleges of agriculture, arts and sciences, law, medicine (situated at Omaha), business administration, dentistry, engineering, education, pharmacy, a graduate college, schools of nursing (at Omaha), music, journalism and a summer school. The forty buildings and other property of the university are valued at about \$11,700,000. Agricultural experimental work is conducted at Union, North Platte, Scottsbluff, Alliance and Valentine. The secondary school of agriculture is situated at Curtis. The annual enrolment of students is about 8,500.

NEBUCHADNEZZAR, *neb u kad nez'zur*, king of Babylon from 605 to 561 B. C., was the son of Nabopolassar. He checked an Egyptian invasion under Necho in 605, drove the invaders back into Egypt and subjugated the intervening region, Syria and Palestine, carrying to Babylon the sacred vessels of the Temple of Jerusalem and the chief Jews into captivity. When these countries revolted in 586 he returned, destroyed Jerusalem and carried 4,000 Jews into captivity. Near the end of his reign he invaded Egypt. During the peaceful years of his rule he rebuilt in a magnificent manner Babylon and many of the other cities of his empire, and constructed vast temples, aqueducts and palaces. Several inscriptions relating to his reign have been found recently.

NEBULA, in astronomy, one of the luminous cloudlike masses visible on very clear nights. About ten thousand are known. The spectroscope has shown that, while a large number of nebulae are composed of star clusters, others are made up either wholly or in part of masses of incandescent gas. Two of the nebulae are visible without a telescope, one in the constellation of Orion, the other in Andromeda. The latter which is the smaller, consists of an oval mass surrounded with several broken oval rings. The Orion nebula is more irregular in shape and contains a number of stars. Both nebulae are of gigantic size; according to the latest theories each is a universe in process of forming out of the plastic substance and gaseous material composing it.

NEBULAR HYPOTHESIS, a famous theory advanced by Kant and Laplace and developed by Sir William Herschel, which attempts to explain the movements and re-

lations of the celestial bodies. According to this hypothesis, the material composing the solar system was originally a rotating and revolving mass of intensely-hot gaseous matter, that, owing to the action of gravity, gradually assumed a spherical form. As the mass cooled and contracted its outermost parts became separated from the main mass and were swept by gravity into a sort of equatorial ring. This ring, continuing the motion of the parent mass, in time was broken and ultimately the matter composing it was gathered into a revolving and rotating sphere. As the central mass kept on cooling, other rings were successively thrown off, and in time the solar system was evolved. The nebular hypothesis has been superseded by the planetesimal hypothesis (see GEOLOGY, subhead *Planetesimal Hypothesis*).

NECKER, *na lair'*, JACQUES (1732-1804), a French statesman and financier. At the age of eighteen he became a clerk in a Paris banking house, and in course of time accumulated a large fortune as a banker. In 1777 he was made director-general of finances. Official corruption under the preceding reign had caused a large deficit, to which the American war made great additions. Necker endeavored to meet the exigency by loans and reforms, and above all, to fund the French debt and establish annuities under the guarantee of the State. His suppression of abuses made enemies at court, and he resigned and retired to Switzerland. The errors of Calonne, his successor, as minister of finance, occasioned Necker's recall, in 1788. In 1789 the advisers of the king succeeded in inducing him to dismiss and banish Necker. No sooner was his removal known than all Paris was in a ferment. The Bastille was stormed, and the king found himself compelled to recall the banished minister. Necker's first object was to restore peace and secure safety of person and property. But he was not equal to the political, or even the financial, crisis, and he resigned in September, 1790. Necker's daughter was the famous Madame de Staël.

NECROMANCY, *nek'ro man si*, sometimes called the Black Art, is a form of divination in which the dead are supposed to answer questions concerning the future. Necromancy originated in the East and is one of the most ancient superstitions. It was practiced by the Greeks, and the works of Homer and other early Greek writers contain frequent

references to it. It is also mentioned in the Old Testament, where it is severely censured. Necromancy was practiced by the nations of northern Europe during the Middle Ages, and later it was united with sorcery. See **SPERMATISM**.

NECROPOLIS, among the ancients, a cemetery in the vicinity of a city, particularly that of Alexandria. In Egypt the burying grounds were sometimes of vast extent. The necropolis at Thebes extended for miles along the west bank of the Nile. The necropolis at Ghuzeh, dominated by the Pyramids, was another extensive cemetery of the ancient Egyptians.

NECTAR, *nek'tur*, in Greek mythology, the drink of the gods, one of the means by which they retained their eternal youth. See **AMBROSIA**.

NECTARINE, *nek'turin*, a species of peach having a smooth skin and firm pulp. See **PEACH**.

NEEDLE, a small instrument of steel, pointed at one end and having, at the other, an eye, or hole, through which is passed a thread for sewing. The earliest needles were made of bone, ivory, wood and bronze. The first steel needles were made in Nuremberg, in the latter part of the fourteenth century, and until the last half of the nineteenth century needles were made almost wholly by hand.

The principal steps in making needles are the following. The wire, which comes to the manufacturer in coils, is cut into pieces of the length of two needles, called *blanks*. The blanks are then straightened by being rolled on a stone or iron table, after which they are pointed by being fastened to a rubber band, so arranged as to give them a rolling motion while the ends are brought against a rapidly revolving grindstone. From fifty to sixty needles can be pointed at once. After the pointing, the blanks pass to a machine which slightly flattens them in the middle and marks the places for the eyes. A second machine punches the eyes, and the needles, still joined in pairs, are then strung on two wires. They are then cut apart between the eyes, and each wire has a row of needles strung on it. The heads and eyes are then finished, and the needles are tempered, polished, sorted and placed in packages for the market. Notwithstanding all the complicated machinery used in this manufacture a needle passes through the hands of seventy

workmen before the process is completed. England is the leading country in the manufacture of needles, and those of the best quality are made there. Most of the needles used in the United States are of English make.

Needles for knitting, crocheting, jacquard loom weaving, sewing machines and various other purposes have their size and form adapted to the use for which they are constructed.

NEGATIVE, a technical term in photography, used to designate a photographic plate or film after it has been developed and its tones have been fixed (made permanent). In a negative all the lights and shadows as they appear in a finished picture are reversed, that is, the parts of a picture which show dark areas are light in the negative, and those that are light in the picture are shown as dark spots in the negative. The picture printed from a negative is called a *positive*, this is what is commonly called a *print*.

NEGLECTENCE, *neg'lijens*, in law, the omission to do that which ought to be done. When such want of care results in injury to another or when it involves a wrong done to society, it renders the guilty party liable either to an action for damages or to trial for misdemeanor. In law there are recognized three degrees of negligence, *ordinary*, the want of ordinary care or diligence, *slight*, the want of slight care or diligence, and *gross*, the want of unusual care or expected diligence.

NEGOTIABLE, *ne go'she a b'l*, **PAPER**, written contracts which can be transferred. A distinction is made between *negotiable* instruments and *assignable* instruments. The former are enforceable by the transferee in his own right, without the risk of being met by any defense that would have held good against the transferor. The latter gives to the transferee only such rights as the transferor held. The most common forms of negotiable instruments are bills of exchange, promissory notes and checks, the common characteristic of these instruments being that they are security for, and are representative of, money. However, these instruments are negotiable only when payable to the order of a certain person or to bearer, or when endorsed by the person to whom they are payable. See **PROMISSORY NOTE**.

NEGRITOS, *na gré'toze*, the name given to several groups of negrolike peoples—the Micopies, Sakai, Aetas, and Tapiro—found in the Andaman Islands, certain of the Philippine Islands, the Malay Peninsula and the interior of New Guinea. The nose is small, flattened or turned up at the tip, and the hair is soft and frizzled. The various tribes speak distinct and mutually unintelligible dialects.

NEGRO, the general name for a division of the human race whose chief characteristics are a dark skin, woolly or kinky hair, flat nose, thick lips and long skull. The original home of the negro is the region in Africa from the Sudan to the Tropic of Capricorn. The Sudanese negroes are considered the best representatives of the group, another important type is the Bantu stock of Central and South Africa. The Bantu group includes such well-known tribes as the Basutos, Bechuanas and Zulus. In the East Indies, New Guinea, Melanesia (the islands east of Australia) and Madagascar there are certain negroid tribes resembling negroes chiefly in color of skin, but authorities for the most part do not classify them as true negroes. The same is true of the dwarf negroid tribes of Africa and the Pacific islands. The negroes of the Americas are chiefly of West African descent.

Negroes as a race are more emotional than white peoples, but authorities are not agreed on the prevalent idea that they represent a lower intellectual type. In the United States the rapidity with which they became civilized has often been contrasted with the aloofness of the Indian, whose tribal instincts were uprooted with difficulty.

Education of the American Negro. Since the close of the Civil War systematic efforts have been made to give the freed slaves and their descendants an education. Through the agency of institutions like the Hampton and Tuskegee institutes thousands of young men and women of the colored race have become self-supporting American citizens. In the field of elementary education there is much to be done. The United States Office of Education has issued a report on the subject, in which it was stated that there is a pressing need for increased public school facilities for negroes, and an equally pressing need for competent teachers. Improved conditions are expected from this realization of the situation.

Related Articles. Consult the following titles for additional information:

Fisk University	Fund
Hampton Normal and	Slater Fund
Agricultural Insti-	Tuskegee Normal and
tute	Industrial Institute
Peabody Educational	Washington, Booker T

NEGRO RACE, or BLACK RACE. See **RACES OF MEN**.

NEGUS, the title of the king of Abyssinia. This ruler's full title is *negus negusti*, meaning *king of kings*.

NEHEMIAH, a distinguished and pious Jew, born in captivity, who was made the cup-bearer of Artaxerxes, king of Persia. He was sent (445 B. C.) as governor to Jerusalem, with a commission to rebuild the walls of that city, thus protecting it from attack. He did much to promote the city's prosperity and instituted many reforms. He went to Jerusalem again in 433, this time for the purpose of enforcing certain Jewish observances and of abolishing certain abuses among the Jewish people. The book of *Nehemiah* is an account of his activities.

NEIGHBORHOOD CENTER. See **COMMUNITY CENTER**.

NELSON, B. C., on the Kootenay River, twenty miles west of Kootenay Lake. It is on the Canadian Pacific and the Great Northern railways, is the center of the mining industry of the region and produces silver, gold, coal, lead, copper and zinc. Population, 1931, 5,992.

NELSON, HORATIO, Viscount (1758-1805), the most celebrated of English admirals. At the age of twelve he entered the navy as a midshipman, and was rapidly promoted. On the outbreak of the war with the French Republic he was made commander of the *Agamemnon*, a vessel of sixty-four guns, and assigned to the Mediterranean. He assisted at the siege of Bastia and at Calvi, losing his right eye in the latter engagement. For his brilliant maneuvers at the Battle of Cape Saint Vincent he was made rear-admiral and was assigned to the task of bringing troops from Elba. He next attacked the town of Santa Cruz, on the island of Teneriffe, but was unsuccessful. In 1798 he was sent to the Mediterranean, he followed Napoleon to Egypt, and in the Battle of Aboukir Bay destroyed the French fleet. For disobedience to orders sent to him in July, 1799, Nelson was recalled, but in 1801 he was employed on the expedition to Copenhagen, in which he effected the destruction of the Danish ships and batteries.

The great period of Nelson's life begins in 1798 with his activities in the Mediterranean in connection with Napoleon's Egyptian expedition. His brilliant victory over the French fleet in the battle of the Nile meant the failure of that expedition, since it cut Napoleon off from his base of supplies.

When hostilities with France were renewed in 1803, Nelson, aboard the flagship *Victory* and as commander in chief of the fleet, again was active in the Mediterranean. When the French fleet, after a two-years' blockade, slipped out of the harbor of Toulon, Nelson started in pursuit and engaged it in the conflict known as the battle of Trafalgar. Although the enemy had been joined by the Spanish squadron, he won the victory—the greatest victory of his life, and his last, since he was mortally wounded—in the greatest naval combat of the age. It was during this engagement that Nelson displayed to his fleet the famous flag signal, "England expects every man to do his duty."

Nelson, although frail of body, possessed an indomitable spirit, and this, together with his quick comprehension and masterful and prompt action, gave him the first place among English naval heroes. His body is interred in Saint Paul's Cathedral, London.

NELSON RIVER, a river of Canada, the most important stream in Manitoba. It issues from Lake Winnipeg and after a winding course of about 400 miles falls into Hudson Bay. Numerous rapids and falls retard navigation, but the river is navigable for steamboats for about eighty miles from its mouth.

NELUMBO, a large family of water plants, resembling water lilies, found in Northern Africa and in warm regions of

Asia and of North America. The distinguishing feature of the plant is a gorgeous blossom, with crisp, satiny petals, characteristic of lilies, and a thick circular fringe of yellow stamens surrounding a large seed receptacle. One species with rose-colored flowers, the sacred lotus of the Hindus and people of Tibet, has been cultivated since remote times in China and Egypt, where the



NELUMBO

Showing seeds and enlarged receptacle

roots, stalks and seeds are used as food. A North American species, with yellow flowers, grows as far north as Ontario. It is commonly called *water chinquapin*, but the favored name is *lotus*, or yellow water lily. This plant grows abundantly in five localities in the United States, notably near Grass Lake, Illinois, where there is a thickly-crowded bed covering 600 acres. When the flowers are in full blossom they present a beautiful appearance.

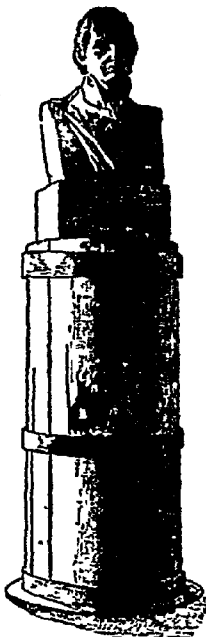
NEMEAN, *ne'me an*, **GAMES**, one of the four great national festivals of the ancient Greeks, so called from Nemea, a valley in the Peloponnesus where the games were celebrated in midsummer, every two years. The games consisted of the usual athletic contests. Eleven of Pindar's odes are in celebration of victors at the Nemean games.

NEMESIS, in classical mythology, the goddess of fate, who apportions to men what they deserve. In Homer she is a sort of personification of divine justice.

NEOCENE, *ne' o seen*, **EPOCH**, a term used by the United States Geological Survey to designate a period in the middle of the Cenozoic Era. It corresponds to the Miocene and Pliocene epochs of European geologists. See **GEOLOGY**, **TERTIARY PERIOD**.

NEPAL, *ne pawl'*, an independent kingdom in the Himalaya Mountains, with traditional ties with the Government of India and Great Britain but entirely autonomous in the direction of its affairs, internal and foreign. A British Resident has been accredited to the country since 1815 and concerns himself with British interests.

Nepal lies between Tibet and British



HORATIO NELSON
and part of the flag-
staff of the *Victory*,
in London

India, is 500 miles long and its greatest width is 150 miles, the total area covering 54,000 square miles or about the size of the State of Arkansas. The ruling caste is of Rajput origin and preserves many of the rights and customs of this warrior clan. Command in the Nepalese army is hereditary.

Until recent years Nepal has done little to develop the vast resources of timber, iron, copper, lead and coal. Khatmandu, the capital, is no longer one of the forbidden cities to foreigners, its population is 50,000. Population of the country, 5,500,000.

NEPHRITE, *nef'rite*, a compact variety of amphibole, ranging in color from white to dark green. Numerous carved ornaments made from this mineral, chiefly in Chinese and Mexican collections, are known as *jade*. It was formerly believed that a piece of nephrite worn or carried on the person would cure kidney diseases, hence the name, derived from a Greek word meaning *kidney*.

NEPHRITIS, *ne fr'i'tis*, the term applied to any disease arising from inflammation of the kidneys. Bright's disease, one of the most serious of kidney disorders, is described in alphabetical order under that heading. Any disturbance of the kidneys should be carefully diagnosed by a competent physician, as interference with the proper working of these organs is liable to affect other vital organs. See **KIDNEYS**.

NEPIGON. See **NIPIGON**.

NEPISSING. See **NIPISSING**.

NEPOS, **CORNELIUS**, a Roman author of the first century B. C., the contemporary of Cicero and Catullus. The only extant work attributed to him is a collection of short biographies. These biographies contain many errors, but supply information not obtainable elsewhere.

NEPTUNE, in classical mythology, the god of the sea, known to the Greeks as Poseidon. He was a son of Saturn and Rhea and a brother of Jupiter and Pluto and was regarded as inferior in power to Jupiter only. Neptune was not entirely satisfied with his share of the universe and attempted at one time to take Jupiter's kingdom from him, in punishment for which attempt Jupiter condemned him to serve for a time Laomedon, king of Troy. Laomedon set him to build the walls of the city, and in this he was assisted by Apollo. The treacherous Trojan king, however, refused to pay to the gods the rewards which he had

promised, and Neptune, to punish him, created a great sea monster, to which a beautiful girl was sacrificed each year. This punishment continued until the monster was finally killed by Hercules.

Neptune also attempted to acquire the supreme power over the city of Athens, and for this purpose he entered into a contest with Minerva, agreeing that the city should be named for the one who created the most useful gift. Minerva created the olive tree, and thus was regarded as of greater benefit to mankind than the horse, Neptune's gift, and the city was accordingly named *Athena*, from Minerva's Greek name, *Athene*. Neptune was represented as a man of middle age, somewhat resembling Jupiter, but with less of dignity and kindness in his aspect. He rode about over the surface of the sea in a chariot drawn by sea horses, and waves were stirred at his approach.

NEPTUNE, the eighth planet from the sun and, excepting Pluto only, the outermost member of the solar system, its mean distance from the sun being about 2,800,000,000 miles. It is about 33,000 miles in diameter and about one and three-fifths times as far from the sun as Uranus, which is next nearer. It revolves around the sun once in 164 of our years. Neptune is wholly invisible to the naked eye, and it is difficult to find and study through the telescope. It was discovered in 1846 in a position which had been indicated independently by two different astronomers. Many had searched for it, and it was at last found at the exact point where it must be to produce the otherwise unaccountable motions that had been observed in Uranus. This is regarded as one of the great triumphs of astronomy. Soon afterwards it was discovered that Neptune has one moon, moving about it from east to west. Through the telescope the planet is so faint and far away that little can be learned about it, and it appears only as a faint body of bluish tint. See **PLANET**.

NEREIDS, *ne'reids*, in classical mythology, sea nymphs, daughters of Nereus and Doris and constant attendants on Neptune. According to some accounts they were human in form, according to others, they had the tail of a fish. They were usually represented as riding about in the sea on horses or dolphins.

NEREUS, in classical mythology, the father of the fifty Nereids, the wise "old man

of the sea," who lived in a cavern in the depths of the Aegean and revealed what he knew only by compulsion. He was seized by Hercules when asleep, although he attempted to escape by assuming various forms, he was forced to disclose the whereabouts of the apples of the Hesperides.

NERO, (A D 37-68), a Roman emperor, the son of Cneus Domitius Ahenobarbus and of Agrippina, the daughter of Germanicus. His mother's second husband, the Emperor Claudius, adopted him, and when Nero was about seventeen years old his mother poisoned Claudius and secured the throne for her son. In the year following his accession Nero disposed of Claudius' son Britannicus, the rightful heir, by poison. Some time afterwards, to please one of his favorites, he caused his mother to be put to death, and then had his wife Octavia murdered.

The affairs of the empire were at this time in a deplorable state, wars raged abroad and general discontent prevailed at home. The emperor, entirely lacking in restraint, gave himself up to the most disgusting excesses. In July, 64, occurred the burning of Rome, Nero, charged with having caused the calamity, to divert popular indignation accused the Christians and persecuted them unmercifully. His debaucheries, cruelties, unjust taxation occasioned several unsuccessful conspiracies against him. He retaliated with wholesale executions, Seneca and Lucan being victims. Finally the Senate openly declared him an enemy to the country, and Nero, to escape arrest, stabbed himself.

NERVA, *nur'va* (A D 32-98), a Roman emperor, who displayed great wisdom and administrative ability during his reign. He twice held the consulship before his election by the Senate to succeed Domitian in A D 96. He was in turn succeeded by his adopted son, Trajan.

NERVES, *nurves*, slender whitish cords that start from the brain or spinal cord and radiate all over the body, ending in the cells and fibers of the different organs. Nerves, or nerve trunks, as they are more properly called, are not single structures, but are bundles of nerve fibers tied together with connective tissue. A particular nerve trunk may contain hundreds of nerve threads that are

distributed to different parts of the body. The nerve elements of nervous tissue are called *neurones*. The connective tissue is known as *neuroglia*. For the character and function of nerves, see **NERVOUS SYSTEM**.

Nerves, Cranial, the nerves which originate at the base of the brain and pass directly from these centers to the various organs of the head and face and the upper part of the thorax. In structure the cranial nerves are more simple than the spinal nerves, and in function they include both sensory and motor nerves (see **NERVOUS SYSTEM**). They are arranged in twelve pairs. The first pair constitutes the nerve of smell (see **SMELL**). The second pair comprises the optic nerves, or nerves of sight (see **EYE**, **VISION**). The third pair has nerve fibers distributed to the muscles of the eyeball, and, together with those of the fourth and sixth pairs, these nerves produce all the movements of the eye, including those of the iris and the eyelids. There are two roots to the fifth pair, containing both sensory and motor nerves. This pair divides into three branches, the first sending fibers to the mucous membrane of the nostrils and the muscles of the skin of the forehead and upper eyelid, the second sending branches to the lower eyelid, the skin of the nose, temples, cheeks, upper lip, palate and the teeth of the upper jaw, the third divides into three branches and is distributed to the side of the head, the external ear, the skin of the lower part of the face, the mucous membrane of the mouth, the tip of the tongue and the teeth and the muscles of the salivary glands of the lower jaw.

The nerves of the seventh pair are distributed to the muscles of the face and are composed almost entirely of motor fibers, which control the muscles of expression. This nerve is sometimes called the nerve of expression. The eighth pair constitutes the nerve of hearing (see **EAR**). The ninth pair contains sensory and motor nerves, and some of its fibers constitute the nerves of taste, while others extend to the muscles of the pharynx and the mucous membrane at the back of the nose and pharynx. Another branch controls the secretions of the parotid glands.

The tenth pair, generally known as the *pneumogastric* nerve, has the longest and most widely distributed trunks. The nerves are both motor and sensory, and the branches



NERO

extend to the pharynx, esophagus, larynx, windpipe, lungs, heart, stomach and intestines, and probably to the liver and the kidneys. The motor fibers of this nerve control all muscles of these organs. The fibers extending to the heart have an inhibitory function, and those extending to the lungs control respiration. The eleventh pair controls the movements connected with swallowing and the respiratory movements associated with any effort. The nerves of the twelfth pair are distributed to the muscles of the tongue and control its movements in swallowing and in speech.

NERVOUS DISEASES, disorders caused by changes in the structure of nerve fibers or centers due to some irregularity of nerve function without actual change in structure. Such diseases may arise from degeneration of inflammation of nerve substance, from pressure of tumors, from the lowered nervous action which comes from general bad health, and from other causes. Many diseases of the nerves may be cured by a change of habits and observance of hygienic rules.

Related Articles. Consult the following titles for additional information:

Aphasia	Insomnia	Neurasthenia
Apoplexy	Locomotor	Neuritis
Catalepsy	Ataxia	Neurosis
Epilepsy	Nervous System	Paralysis
Hysteria	tem	Saint Vitus's
Insanity	Neuralgia	Dance

NERVOUS SYSTEM The human body may be compared to a great enterprise which is being conducted by a vast army of laborers, all working under the supervision of a master director. He is constantly in communication with his workers, and sees to it that they so cooperate with each other that work is carried forward harmoniously and effectively. In the human body the various organs represent the laborers, and the nervous system the directing force. Just as a business house, an army, or a country must have a central supervising system, so must the body. The parts of this human directing force are the brain and the spinal cord, the nerve trunks radiating from them, and the ganglia. These latter are rounded or oval masses that serve as centers from which the nerve trunks of the sympathetic system radiate (see subhead below).

The Cerebro-Spinal System This division of the nervous system includes the brain, the spinal cord and nerves branching off from them. The *spinal cord* is a mass of nerve

matter filling the canal of the spinal column and extending from the medulla oblongata to the middle or lower margin of the first lumbar vertebra. It is about eighteen inches long and is divided by deep fissures into right and left halves, each of which consists of anterior, lateral and posterior columns. The outside of the cord is composed of white nerve fibers, and the inside consists of gray matter, forming an irregular mass whose vertical structure somewhat resembles the letter *H*. At the lower extremity the spinal cord divides into a number of nerve trunks, some of which continue downward within the spinal column to the sacrum. In the lower part of the neck there are also enlargements, from which nerves branch off to the arms, and in the lumbar regions are similar enlargements, from which branch the nerves to the lower extremities. Between these points the spinal nerves branch off in pairs upon each side of the cord and pass out of the spinal column through the openings between the vertebrae. In all, there are thirty-one pairs of these nerves, each pair consisting of two sets of nerve fibers—sensory and motor.

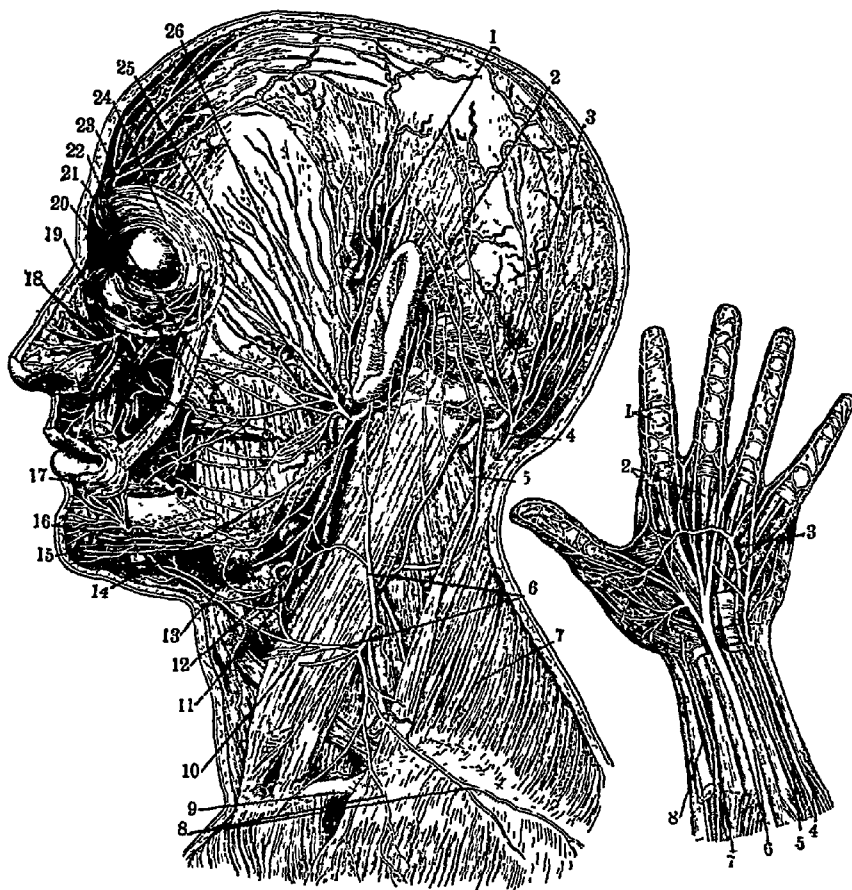
The sensory, or *afferent*, nerves originate in the posterior column of the spinal cord, and before joining the motor nerve the fibers form a ganglion. These are the nerves of feeling, which transmit impressions from without through the spinal cord to the brain centers. The motor, or *efferent*, nerves originate in the anterior column of the spinal cord, but do not form a ganglion before joining the sensory nerve. The sensory and motor nerves meet and constitute a pair as they emerge from the spinal canal and run side by side to their extremities. Wherever one divides, the other makes a similar division, until in their final subdivisions they become so small that the fibers cannot be distinguished. Motor nerves are nerves of motion and convey impulses from the nerve centers outward.

These nerves look like white cords and are called nerve trunks when they branch from the spinal cord. Each one consists of a central axis of gray matter, usually known as the *band axis*, enclosed in a sheet of white, fibrous nerve tissue. The nerves then interweave and form networks, or plexuses, of nerve fibers, and in their last divisions they constitute a complete network in the skin, where the sensory nerves are so numerous that

a prick from the finest needle anywhere on the surface of the body injures one or more of them, and the pain arising from the wound makes the person conscious of the injury

The Sympathetic System This system consists of a series of ganglia, extending from the head through the neck, thorax and abdomen to the pelvis In the thoracic and ab-

dominal cavities the ganglia are arranged in pairs on either side of the spinal column and terminate in a single ganglion in the pelvis The sympathetic nerve centers of the head distribute nerve fibers to the muscles which control the pupil of the eye and to the palate and glands about the mouth The thoracic ganglia are twelve in number and are all



SUPERFICIAL ARTERIES AND NERVES OF THE FACE AND NECK

1, Temporal artery, 2, artery behind the ear, 3, occipital artery, 4, greater occipital nerve, 5, smaller occipital nerve, 6, nerve of the neck, 7, trapezius muscle, 8, clavicular nerves, 9, clavi- cle, 10, sterno-cleido-mastoid muscle, 11, outer artery of the head, 12, inner artery of the head, 13, salivary gland, 14, nerves of the lower jaw, 15, outer maxillary artery, 16, nerve of the chin, 17, circular muscle of the mouth, 18, greater zygomatic muscle, 19, nerves below the eye, 20, masseter, or chewing muscle, 21, ear passage, 22, arteries of the forehead, 23, nerves of the forehead, 24, eye-closing muscle, 25, facial artery, 26, facial nerve

NERVES OF THE HAND

1, Nerves of the skin, 2, tendons, 3, arteries of the palm of the hand, 4, elbow nerve, 5, elbow artery, 6, nerve of the forearm, 7, nerve of the under-arm, 8, artery of the under-arm

connected by a sympathetic cord. They also communicate with the cerebro-spinal nerves. Nerves from these ganglia pass to the different abdominal organs and control the action of the glands whose functions are concerned with digestion and excretion. The two principal ganglia of the abdominal cavity are the largest in the system, and the branches from these unite to form the *solar plexus*, which is situated directly back of the stomach. This ganglion sends nerves to various abdominal plexuses and also to the blood vessels that follow the intestines and the other abdominal organs. These ganglia are also connected with each other by a systematic cord and by spinal nerves with the cerebro-spinal system.

In structure and general appearance the sympathetic nerves resemble those of the cerebro-spinal system. They are less sensitive and slower to act than the cerebro-spinal nerves, and they preside over the vital functions—circulation, digestion, secretion and excretion.

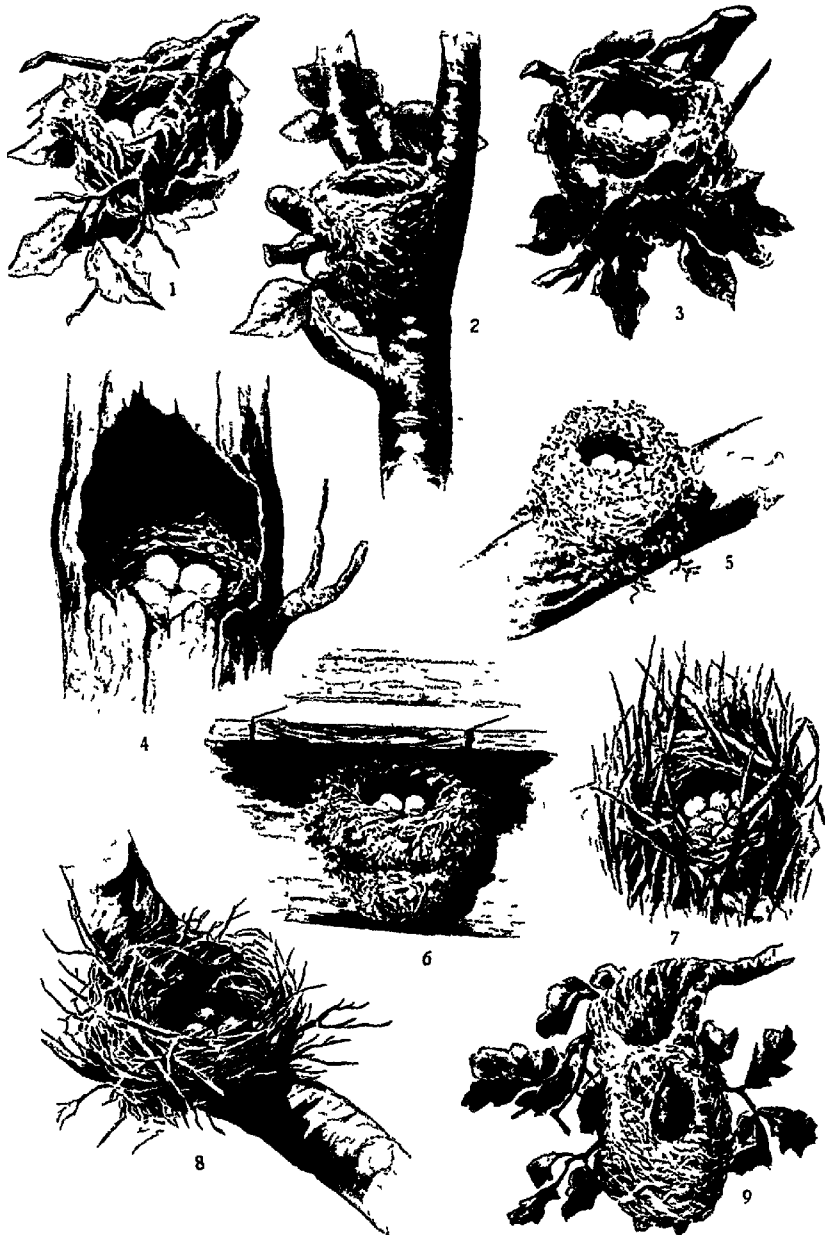
Physiology. The functions of the nervous system are to coordinate the movements of the body and to bring to the centers of intelligence and action communications from the outside world. The nerves of the cerebro-spinal system are arranged in pairs. One nerve of each pair, the sensory, carries impressions from without to the brain, and the other, the motor, carries them from the brain and other nerve centers outward. A nerve can be aroused to action artificially by any of the following means. Mechanical action, such as touching, striking or pinching, a change of temperature, provided it is sudden, as when the hand is brought in contact with a hot or cold object; chemical action, such as that of a strong acid or alkali, electricity. The stimulus arising from any of these agencies is caused by the suddenness of action. A slow rise or fall in temperature will not give rise to a nerve impulse. There are also many stimuli to action from within the body, which are recognized by their outward manifestations, such as the movements arising from the decision to perform a certain act, as throwing a ball or writing a letter. There are other acts of stimuli that act upon special nerves, such as the optic, auditory and olfactory.

The nature of nerve impulse is not well understood, but it is known to be wavelike in its movements, and it traverses the nerves

at the rate of about 100 feet per second. All impulses belong to one of two classes, those that produce feeling and those that produce motion. Both kinds traverse the nerves in both directions. Each kind originates in the class of nerves to which it belongs, motor impulses cannot be excited in, or made to traverse, sensory nerves, nor can sensory impulses be developed in or made to traverse motor nerves. The nature of the impulse is the same, whatever the cause that excites it, and within certain limits its strength is proportional to the strength of the exciting cause. Impulses arising in one set of nerves, as the sensory, are transmitted to the other, as the motor, through nerve centers in which the fibers of these nerves intermingle. If one lays his hand upon the point of a tack, the injury excites an impulse in the sensory nerve. This is carried inward until the fibers of the injured nerve mingle with those of the corresponding motor nerve, when the impulse is transmitted outward along the motor nerve and causes the hand to be withdrawn from the object. Movements of this sort are known as reflex.

Hygiene. The nervous system is the most sensitive organism of the body, and consequently it is most easily influenced by unfavorable conditions. The first requisite to its health is a good supply of pure blood. About one-fifth of the blood in the body is required to nourish the brain, and the other organs of the nervous system require a proportionately large amount. If the blood is impure the brain and nerves are not properly nourished. Pure air, plenty of exercise and nourishing food are essential to pure blood and thus to the health of the nervous system. Another important requisite is a sufficient amount of sleep and rest.

Many drugs used for the alleviation of pain are beneficial when administered under the direction of a physician, but they are decidedly injurious when taken indiscriminately, and their continuous use soon produces a habit which it is almost impossible to break. Among drugs whose use should be avoided, except when prescribed by a physician for a limited time for the alleviation of pain, are chloral, cocaine, opium, morphine and numerous coal tar preparations, such as antifebrin and antipyrin. These drugs act directly upon the nerve centers, dulling their sensitiveness, preventing proper nutrition of the nervous system.



BIRDS' NESTS

- 1, Red-Eyed Vireo (1-3)
- 2, Redstart (1-3)
- 3, American Goldfinch (1-3)

- 4, Bluebird (1-3)
- 5, Humming Bird (1-2)
- 6, Phoebe (1-4)

- 7, Meadow Lark (1-3)
- 8, Bluejay (1-5)
- 9, Baltimore Oriole (1-5)

and in every way impairing its usefulness.

The habitual use of alcoholic and malt liquors and tobacco has a similar effect. These substances are especially injurious to the young, whose nerves and brain are in a formative condition. Perhaps the greatest danger arising from the use of any drug or narcotic is the tendency to form an unnatural appetite for it, which increases with the habit, until the person becomes overpowered by the craving. For these reasons, as well as many others of which the limits of this article will not admit mention, substances of this sort should be strictly avoided.

Related Articles. Consult the following titles for additional information

Blood	Eye	Nervous Dis-
Brain	Ganglion	eases
Breathing	Medulla Ob-	Senses, Spécial
Circulation	longata	Spinal Cord
Ear	Nerves, Cranial	Reflex Action

NEST, the name given to the homes built by birds, chiefly as safe places in which to hatch their eggs and rear their young. Nearly all birds build nests of some sort, and the marvelous instinct that leads every bird to build its nest exactly as its parents did before it, is one of the strangest things in nature. In nest building birds rarely give any attention to their own comfort, but they prepare a place which will insure the hatching of their eggs and the protection of their young while they are helpless. A few species, however, build no nests at all, but drop their eggs into the nests of other birds and abandon them to the foster parents. For instance, the American cowbird will lay its eggs in the nest of the yellow warbler. Not infrequently the warbler resents the presence of this foreign egg and builds a second nest above the first, abandoning its own eggs in so doing. Cases are known where a nest has been built in this way in three tiers before the warbler was able to remain in undisturbed possession of her own nest.

Ground Nests. There are other species that lay their eggs upon the bare rocks or in little holes in the sand and sit patiently upon them there. Most of the water fowl and many of the shore birds build their nests upon the ground. In nearly all cases some attempt is made at concealment, and even when the nests are rudest, the bird still remembers to make them harmonious with their surroundings, or to put them in some inconspicuous place. The wild turkey will never leave her nest until she has safely covered the eggs with leaves. Although some of the

ground nests are little more than rude platforms of twigs, others are elaborately woven and carefully lined with soft moss or even with down plucked from the breast of the bird herself.

In the tropics, some birds collect large piles of vegetable matter, and after it has decayed for some days, they will lay their eggs in holes in this mass, which in rotting furnishes the heat to hatch the young chicks. The kingfishers, sand martins and other birds excavate deep burrows into a bank, usually facing the water, and lay their eggs in rude little nests at the end. These burrows are usually not straight. The kingfisher's gallery may turn abruptly to the right or left. The petrel found in the United States digs a very tortuous gallery of considerable length, so that its nest is frequently directly under the opening. In the southwestern parts of the United States the burrowing owl lives in the homes of the prairie dogs.

Varieties of Tree Nests. The most remarkable nests are those which are built either in trees or in small shrubbery above the surface of the ground. Here the diverse habits of the birds show themselves at once. The robin and certain other birds make a foundation of clay, which they cover with twigs and leaves and line with hair or other soft substances. The clay is molded and carefully plastered in position, but neither the robin nor the swallow, which builds a purely clay nest, will use the structure until it is well dried. Some of the bottle-shaped clay nests of the swallows are curious affairs, with protruding necks bent downward so that the opening of the nest is from below. Woodpeckers dig their way into dead trees or stumps. The ivory-billed woodpeckers are strong enough to excavate a nest in the hardest wood. Many other birds build in holes or crevices in trees and stumps that they have not excavated for themselves. An example of this class is seen in Fig 4 of the color plate.

A familiar example of the best of the nest work is that of the Baltimore oriole, whose slender hanging nest, far out on the tip of some slender twig, is well protected against invasion (see Fig 9). The weaver birds make curious, swinging, bottle-shaped structures, which are entered from below, the nest itself being built within, on the side of the bottle. In Mexico a flycatcher builds a remarkable structure, sometimes three or four feet long by two wide, on one side of

which is an opening leading into the nest. Other small and timid birds build their nests in crevices on the outside of the flycatchers' home. Some of our birds build exquisite little nests, and nothing is prettier than the delicate work of the ruby-throated humming-bird, as may be seen in Fig 5 of the color plate. The tailor bird sews the leaves of its nest together. The great variety and wonderful forms of the nests make it impossible to give any extended description of them all.

NES'TOR, a Greek hero, son of Neleus, king of Pylos. He took part in the hunting of the Calydonian boar, in the Argonautic expedition and, although he was at that time very old, in the Trojan War. During that struggle he was the wisest adviser of the Greek chiefs.

In modern times a person whose judgment is unerring or who shows great wisdom in the solution of questions of moment is popularly referred to as the "Nestor of Congress," the "Nestor of the press," etc.

NET, an open fabric, made of thread, twine or cord, woven into meshes of fixed dimensions, firmly knotted at the intersections. Nets are used for a great variety of purposes, as for protecting fruit trees, for collecting insects, for hammocks and for screens, but chiefly for hunting and fishing. The chief kinds of nets used in fishing are the trawl, the drift, the seine, the kettle, or weir, and the trammel, or set net. The *trawl* is a triangular bag, with an arrangement for keeping its mouth open, and it is drawn along the bottom of the water. *Drift* and *seine* nets are very long in proportion to their breadth and differ from one another only in the manner in which they are employed. The *seine* has a line of corks along one of its long borders, and a line of leaden weights along the other, so that when thrown into the water it assumes a perpendicular position. It is used near the shore, being dragged to land with any fish it may enclose, by ropes fastened to the ends. The *drift* net is not loaded with lead, but floats in the water, and is used especially in herring fishing, the fishes as they drive against it becoming caught by the gills. *Kettle* and *weir* nets are structures fixed on stakes placed along the coast between high and low water. *Trammel* or *set* nets are also fixed between stays, but act like drift nets. See **FISH AND FISHERIES**.



NETHERLANDS, THE, or **HOLLAND**, a kingdom on the western coast of Europe, forming, with the coastal region of Belgium, the "Low Countries" of that continent. With an area but slightly greater than that of the state of Maryland, the Netherlands is one of the most important of the small states of the world, and its people are everywhere honored for their sturdy independence, industry and integrity. This small state governs a great colonial empire (see subhead *Colonies*, below), and has as subjects about seven times as many people as live in the kingdom.

The word *Nederlands*, as these people write it, means *lower lands*, and is an appropriate name for a country that for centuries has been saved from inundation only by the construction of great dikes. *Holland*, which is the more common name for the kingdom, belongs properly to two provinces, North and South Holland. The word is supposed to mean *hollow land*. Outsiders usually call the people of the Netherlands *Hollanders*, or *Dutch*; the latter is a corrupt form of *Deutsch*, which means German. Reasonably enough, the people prefer their proper designation of *Nederlanders*.

Location and Area. The Netherlands touches Germany on the east and Belgium on the south, and its west and north boundaries are shore lines of the North Sea. The land area, 12,582 square miles, will eventually be increased about 530,000 acres by the draining of the Zuider Zee (*z'der zee*), a large shallow arm of the North Sea, nearly land-enclosed. Centuries ago the land below the waters of the Zuider Zee was covered with a dense forest having within it a lake of moderate size. By the gradual overflow of the waters of this lake the country for miles about became a soggy marsh, and in the thirteenth century the region was swept by an inundation of the North Sea. Thousands of villages were destroyed and the entire geography of that portion of the Netherlands was wholly changed. For many years the *Hollanders* have been considering the reclamation of the land stolen from them by the

sea, and in 1913 the national legislature, or States-General, passed an act authorizing such reclamation. The outbreak of the World War, in 1914, necessitated a postponement of this plan, but early in 1919 the matter was again taken up by the States-General. A dike has been built across the mouth of the gulf, large areas (polders) have been drained, and what is left of Zuyder Zee is called Yssel Lake, a fresh water lake fed by the Yssel river. The cost of this undertaking has been over \$200,000,000.

The People and Cities. In 1934 the Kingdom of the Netherlands had a population of 8,290,390, or 659 inhabitants to the square mile. Maryland, the American state corresponding to it in size, has about one-fifth as many people. In 1934 there were in Holland forty-three cities with populations over 25,000, as compared with three for the American state. Amsterdam, the Dutch metropolis, had a population of 778,450, about 25,000 less than Baltimore. Holland's first five cities, in order of size, are Amsterdam, Rotterdam, The Hague (the capital), Utrecht and Haarlem.

The Netherlands belong to the Teutonic branch of the human family, and in many respects are like their thrifty, industrious German neighbors. The inhabitants of Lumburg province, however, which adjoins Belgium, seem more akin to the Belgians. Among the peasants of the provinces one still sees the picturesque Dutch costume made familiar by pictures. The Hollanders are a religious people, and permit complete freedom of worship. Nearly two-thirds of the inhabitants of the country are Protestants, and the greater part of the remainder are Roman Catholics. Most of the Protestants are members of the Dutch Reformed Church. There are over 100,000 Jews.

Language and Literature. The language spoken in the kingdom, as well as in the East and West Indian colonies of the Netherlands and by the Boers in South Africa, is popularly called Dutch. It is closely related to Low German, or Plattdeutsch, and appears in a number of dialects. Flemish, spoken in Lumburg and Brabant provinces, and in Belgian Flanders, is almost identical with Dutch.

The earliest Dutch literature consists of versions of the Arthurian legends, the song of Roland and other French romances, and some of these date from early in the thirteenth century.

A version of *Reynard the Fox*, produced about 1250, is the first noteworthy example of literature in the Dutch language. The Old Testament had been translated and the *Life of Jesus* produced before the Reformation, which affected Dutch literature strongly, as it did that of other countries. The contest with Spain late in the sixteenth century gave rise to many battle songs and hymns in praise of liberty. By the beginning of the eighteenth century, poetry and the drama, which had flourished during the previous century, had become so greatly affected by French literature as to retain little of their distinctively national character. During the nineteenth century perhaps the most noteworthy men in Dutch literature were Lennep, Dekker and Maartens, novelists, Hasebroek, an essayist, the poets Genestet, Da Costa and Ten Kate, and the critic Ten Brink. See MAARTENS, MAARTEN.

Art. See PAINTING, SCULPTURE.

Education. Since 1900 education has been compulsory, the school age is from six to thirteen. Private schools, including those under denominational control, are under government supervision and inspection, and receive state aid. About three-fifths of the children attend public schools. Above the primary schools are the industrial, professional and burgher schools, and the gymnasia, besides vocational courses, these institutions give those taught in the ordinary American high school. Instruction in them is not free, but they are well attended. There are four public universities, located respectively at Leiden, Utrecht, Groningen and Amsterdam. In 1918 the Veterinary School at Utrecht and the Agricultural School at Wageningen were created universities.

Surface and Drainage. The Dutch have an old proverb which runs, "God made the sea, but we make the shore." For centuries the people have fought the encroachments of the sea. Some portions of the surface of the country are from sixteen to twenty feet below sea level, and nearly all parts are too low for natural drainage. In great part the coast is so low that, were it not for massive dikes, large areas would be inundated. In the interior, also, dikes are a common feature, being built to protect portions of land from the lakes and rivers or to enable swampy pieces of land to be reclaimed by draining. These enclosed lands are called *polders* and by the formation of these polders the avail-

able land of the country is being constantly increased in area. Lakes and marshes are converted into fertile fields and considerable areas are even rescued from the sea. The windmills seen everywhere are used constantly in the work of draining and pumping.

Almost the only highlands in the Netherlands are the sand hills, about 100 to 180 feet high, which form a broad, sterile band along the coast of South Holland and North Holland, and a chain of low hills, probably of similar origin, southeast of the Zuider Zee. The highest elevation, 1,050 feet, is in the extreme southeast, in Limburg. The general aspect of the country is flat, tame and uninteresting, and about one-fifth of the whole surface consists of marsh, sand, heath or other unproductive land.

The coast line of the Netherlands is very irregular, the largest indentation being the Zuider Zee. In the same line with the sand hills, extending past the mouth of the Zuider Zee, runs a chain of islands, namely Texel, Vlieland, Ter Schelling, Ameland and others, which seem to indicate the original line of the coast before the ocean broke in upon the low lands. The most important rivers of the Netherlands are the Rhine, the Maas, or Meuse, the Scheldt and the Yssel. The Rhine is over one-half mile wide where it enters the country. It soon divides, the south arm, which is the more important division, taking the name of Waal and uniting with the Maas. The north arm, communicating with the Yssel, takes the name of Lek. The Maas, entering the Dutch Netherlands from Belgium, receives the Roer. Of the Scheldt, little except the mouth is within the boundary of the Netherlands. The navigable canals are collectively of more importance than the rivers. The chief of these are the North Sea Canal, fifteen miles long, between the North Sea and Amsterdam, and the North Holland Canal, forty-six miles long, between Amsterdam and the Helder. There are numerous smaller canals, all of the towns and many of the villages being connected with one another in this manner. Most of the domestic traffic of the country is over these canals. Lakes are very numerous.

Climate The climate of the Netherlands is humid, and there are few sunny days. The annual rainfall is about thirty inches; rain falls about 204 days in the year. The range of temperature is not great, as the

average temperature for the coldest months is slightly over 35° F., the average temperature for the hottest months slightly over 64° F.

Industries. As the land of this coastal plain is composed largely of debris brought down to the sea by the agency of ice or water, minerals are very scarce. Coal is mined in small quantities in Limburg. Peat is very plentiful, and the cutting of peat is an industry of some importance. Gardening and agriculture have attained a high degree of perfection. Wheat, while of excellent quality, can be grown only in favored portions of the southern provinces: rye, oats, buckwheat, horse beans, beets, madder and chicory are more common crops. Tobacco is cultivated in the provinces of Gelderland, South Holland and Utrecht; flax in North Brabant, the south of North Holland, Friesland and Zeeland; hemp, sugar beets, oil seeds and hops, in various parts of the kingdom. Culinary vegetables are cultivated on a large scale. Large quantities of them are sent to England, and the exportation of the seeds forms an important article in Dutch commerce. The cultivation of flowers has been carried to a point unequaled in any other country of Europe, and flower seeds and bulbs are exported to all parts of the world.

Stock raising is an important industry, especially in the coast provinces. Cattle, horses, sheep, swine and goats of excellent breed are reared in great numbers. Dairy products, especially cheeses, are marketed in immense quantities. In the estuaries of the great rivers, in the coast waters and in the open sea, fishing is very extensively carried on. Sprats and oysters are the chief products of the coast fisheries and herring is the principal product of the deep-sea fisheries. Hundreds of thousands of herring are taken annually, and the process of curing these fish is a Dutch invention, which has been very widely copied.

Because there is very little coal mined, the Netherlands has never developed as a great manufacturing country, but textiles, silks and velvets are produced in profitable quantities, and Delft is still a famous center of the manufacture of glazed earthenware. The Dutch also make tobacco pipes of excellent quality. An industry of more than national renown is that of diamond cutting, chiefly carried on by the Jews of Amsterdam.

Transportation and Commerce. The canal system is so general that railroads are of importance chiefly for international, rather than internal, commerce. There are about 2,400 miles of railway, 1,800 miles of tramways and 2,000 miles of canals and river navigation. In the winter time the canals are crowded with men, women and children, skating for purposes of business or pleasure.

The Netherlands is one of the important trading countries of the world. The foreign commerce is chiefly carried on with Germany, Great Britain, Belgium, the Dutch East Indies and the United States. Rotterdam and Amsterdam are the centers of the foreign trade. The importation and re-exportation of the products from the Dutch colonies throughout the world is one of the chief branches of the commercial activity. Free trade is a national policy.

Colonies. The colonial possessions of the Netherlands are found chiefly in the East and West Indies. They cover an area of about 790,000 square miles, and have an estimated population of 61,000,000. The island of Java is the most important of these dependencies. Other possessions include the islands of Sumatra, Borneo and Celebes, Surinam, or Dutch Guiana, on the north coast of South America, and Curaçao, an island north of Venezuela.

Government. The kingdom is divided into eleven provinces—North Brabant, Guelders, South Holland, North Holland, Zeeland, Utrecht, Friesland, Overijssel, Groningen, Drenthe and Limburg. These are divided into 1,070 communes. In each province there is a representative body, the members of which are elected by direct vote for four years. These local bodies, called provincial states, pass ordinances pertaining to their respective provinces, but all such ordinances must be approved by the sovereign.

The national legislature, the States-General, is composed of two chambers, the First (*Eerste Kamer*) and the Second (*Tweede Kamer*). The former has fifty members, elected by the provincial states for nine years. The Second Chamber has one hundred members, elected by the people for four years. All legislative measures originate in the Second Chamber.

The sovereign appoints as an advisory and executive body a state Council (*Raad van State*) of fourteen members, which is consulted on all important matters. There

is also a Cabinet responsible to the States-General, corresponding to the Cabinets of Great Britain, France and other European countries.

History. The Netherlands comprised originally the territory embraced by the present kingdoms of the Netherlands and Belgium. The Romans, who subjugated the native tribes in the first century of the Christian Era, ruled the country until about the beginning of the fifth century, when the Franks crossed the Rhine and conquered the southern part. Although for a time the Frisians in the northern part of the country preserved their independence, about the eighth century the whole territory was incorporated in the Frankish Empire, and the people were converted to Christianity. When Charlemagne's empire was divided after the death of his son, Louis the Pious, the region of the Netherlands was divided into three parts, the northern part falling to Germany, the central to Lotharinga and the southern to France.

Gradually the northern province became distinctly German in language and customs, and the southern part became French, while the central province combined the characteristics of the two others. In the latter part of the Middle Ages the cities of the Netherlands, especially Bruges, Ghent and Antwerp, rose to great importance through their commerce and manufactures. In the fourteenth century the entire territory passed under the rule of the Dukes of Burgundy, and through the marriage of Mary of Burgundy, the daughter of the last duke, with Maximilian of Austria, the Low Countries became a possession of the House of Hapsburg. Under the grandson of Maximilian, Charles V, the Netherlands were first formally united with the Spanish crown.

This union was disastrous for both countries, because the greater part of the inhabitants of the Netherlands were strongly Protestant, while Spain was the most radically Catholic country of Europe. Charles V, who had been born in the Netherlands and loved the Dutch people, did little toward enforcing the Catholic religion, but his son, Philip II, oppressed the Dutch beyond the limits of endurance. Finally, under the leadership of William of Orange and the Counts Egmont and Hoorn, the people rose in rebellion. The Duke of Alba was sent with a Spanish army to the country and was instructed to deal with it as conquered territory. Persecution

began at once, and several of the most prominent and patriotic citizens, among them the Counts Egmont and Hoorne, were put to death. In 1568 William of Orange, who had escaped death by withdrawing from the country, returned and undertook its liberation. During the war which followed, many prosperous Dutch towns endured sieges and were sacked when captured. The hatred for Alva increased, and as Philip II was not satisfied with the effects of his rule, he recalled him and sent in his place Requesens.

In 1576 the southern provinces entered into an alliance with the northern provinces, which was known as the Pacification of Ghent, but Alexander Farnese, who became viceroy of the Low Countries in 1578, was able by diplomatic measures to separate the southern provinces from the northern and to induce the former to return to their allegiance to Spain. The northern provinces, however, by the Union of Utrecht, in 1579, declared their independence of Spain. William of Orange now became the ruler of Holland and Zeeland, and the Duke of Anjou, the brother of Henry III of France, assumed control of the other provinces. In 1584 William of Orange was assassinated. From this time on, Philip was too much occupied with affairs in France and England to give much attention to the Netherlands, but Austria carried on the struggle against the United Provinces, and although the Dutch were everywhere successful on the sea, the country was desolated by the wars and a twelve years' truce was concluded in 1609.

The independence of the Netherlands was now recognized by all the powers except Spain, but it was not fully assured until the Peace of Westphalia, at the close of the Thirty Years' War in 1648. In the seventeenth century the Netherlands became one of the foremost commercial and maritime powers in the world, and for a long time maintained dominion on the sea. The southern provinces were ruled first by Spain and then by Austria, and in 1797 they came under the power of the French Republic. In 1806 Napoleon made the Netherlands into a kingdom for his brother Louis Bonaparte, and in 1810 this kingdom was united with France. The Congress of Vienna in 1815 joined Belgium and the Netherlands in a single kingdom with William I, the son of the last stadtholder, as king. This arrangement was very unsatisfactory, as the inhabitants of Belgium

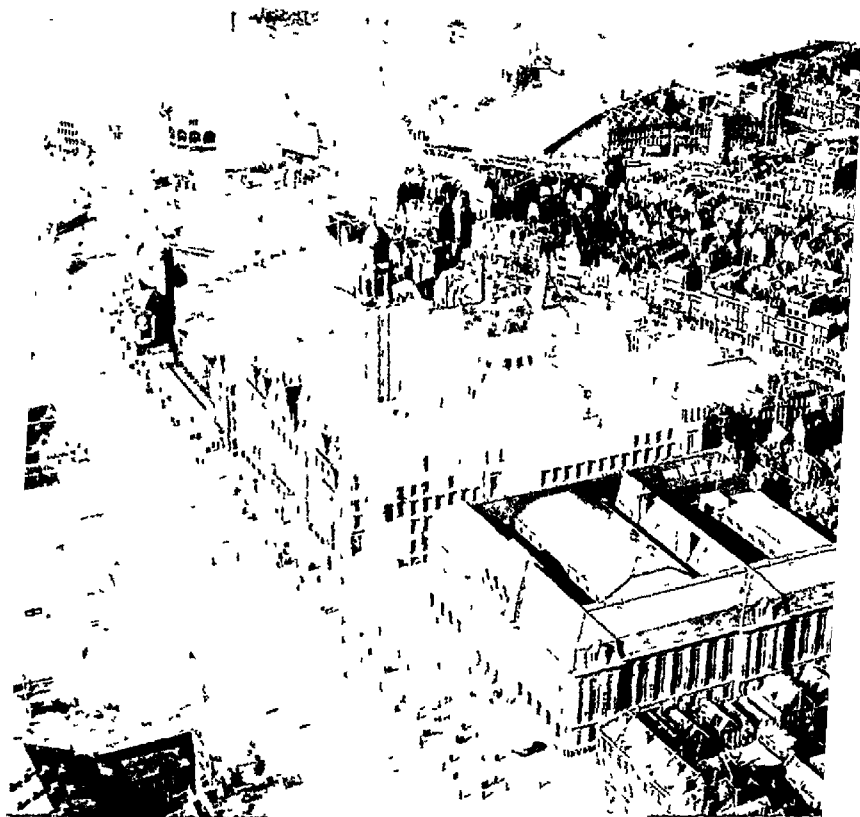
were almost all Catholics and the inhabitants of the Netherlands were with few exceptions Protestants. In 1830 Belgium declared itself independent, and although the king of the Netherlands made determined efforts to put down the revolt, the European powers at length intervened and guaranteed the independence of Belgium.

The people of Holland under William II and William III obtained increased freedom and prosperity. Upon the death of William III, in 1890, Wilhelmina became queen, under the regency of her mother. In 1908 she became of age, and was formally crowned queen. In 1898 The Hague was chosen as the meeting place of the International Peace Congress, and following this came the establishment at The Hague of an International Tribunal for arbitration.

Sorely Tried by War. The period of the World War was critical for the Hollanders, as they were restricted in their commerce both by the allied blockade and the German submarine warfare. At times the importation of necessary foodstuffs was so curtailed that the poorer classes suffered greatly. In spite of these difficulties the little kingdom maintained its neutrality and won the respect of all the belligerents, especially as it gave impartial aid to refugees of all countries. In the spring of 1918 considerable feeling was shown against the United States because of the President's requisition of eighty-seven Dutch ships in American harbors, to be used for allied war purposes. Fortunately the incident caused no break between the two countries, though the Netherlands government, fearing German retaliation, protested vigorously against President Wilson's action. Early in 1919 most of these ships were returned.

At the close of the war there was much social unrest in Holland, as in many other countries throughout the world, and for a time a bolshevik revolution was feared. Another cause of anxiety was the feeling aroused when the former emperor of Germany sought refuge in Holland at the time of his abdication. The government, considering him a private individual, refused to interfere with him, as that would violate the right of sanctuary. In 1920 the country refused to deliver him to the allied nations for trial.

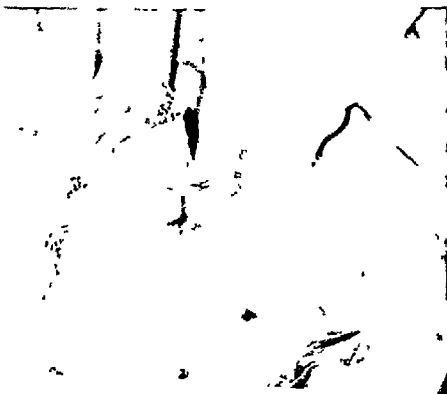
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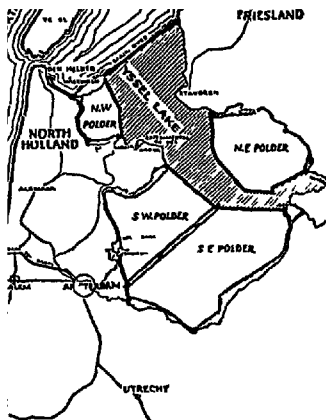


Travel Magazine—Orient at

THE NETHERLANDS

The attractive city of Rotterdam, a great seaport. The exquisite lace cap on the girl at the left and the picturesque dress of the dairy maids are slowly giving way to more modern garb, much to the regret of a world that loves beauty and quaintness.



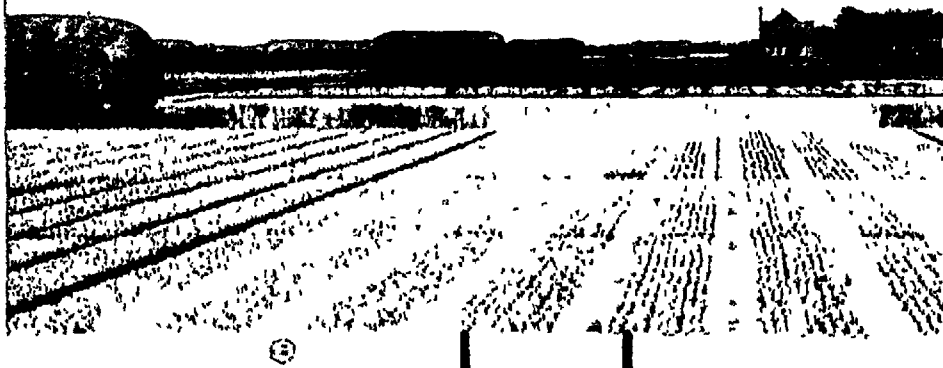


THE NETHERLANDS

The wealth of hyacinths (below) give the countryside the appearance of a gayly painted field. When the Zuider Zee is reclaimed many of the fisher-folk must turn to agriculture. The map shows the reclamation project. The polders are land already recovered.



Tr



GEOGRAPHY		
Amsterdam	Haarlem	Rotterdam
Borneo	Hague, The	Scheidt
Celebes	Java	Sumatra
Delft	Leyden	Utrecht
Guiana, Dutch	Rhine	Zuider Zee
HISTORY		
Belgium, subhead	Tromp	Martin
History	Wilhelmina	
Bonaparte, Louis	William I, Prince of	
Charles V	Orange	
Philip II	World War	

NETTLE, *net'l*, the name given to a large family of plants, most of them covered with extremely fine-stinging hairs. Nettles originated in Europe and to-day are used in many countries for fodder. They yield a tough fiber, which was employed in Germany during the World War as a substitute for hemp. In Dresden a thread is produced from nettles, which is so fine that sixty miles of it weigh only two and one-half pounds. One kind of nettle is used in China to make Chinese grass cloth, and various other species are used for textile purposes. A yellow dye is made from nettle roots, green dye is produced from the leaves and stalks.

NETTLE TREE, a name applied to several trees which belong to the nettle family but lack the tiny stinging spines. The common, or European, nettle tree grows to the height of thirty or forty feet and is frequently planted for ornament in Southern France and Northern Italy. The wood is useful for various purposes. One species, sometimes called the *sugar berry*, is one of the larger trees of the genus, often attaining a height of from sixty to eighty feet. It is a native of North America from Canada to Carolina. Another variety, the American nettle, is often called *hackberry*.

NEUCHÂTEL, *nu sha tel'*, a lake in the western part of Switzerland, eighteen miles north of Lake Geneva. It is the third lake in size in Switzerland, twenty-four miles long and from two to five miles wide. Its shores, which are in part low and marshy, are not so picturesque as those of other Swiss lakes. Regular lines of steamers ply between the cities of Neuchâtel and Estavayer.

NEUCHÂTEL, **SWITZERLAND**, the capital of the canton of the same name, on Lake Neuchâtel, twenty-five miles west of Bern. It has some beautiful streets and interesting buildings, among which the most noteworthy is the twelfth-century abbey church. The city possesses a large library, a university, a museum of fine arts, a museum of natural history, an observatory and a number of schools. Watches and jewelry are manufac-

tured, and the trade of the city is considerable. Population, 1930, 22,075.

NEURALGIA, *nu ral'ja*, a term which means *pain in a nerve*. Neuralgic pains most frequently have their seat in the head or face, but they may occur in other parts of the body. Although the nerves ache in neuralgia, the disease arises from unhealthful conditions elsewhere, and not from alteration in the nerve structure. In this respect does neuralgia differ from neuritis, which is inflammation of the nerve. The neuritis pain is steady, and the affected nerve is tender, in neuralgia the pain is intermittent. Neuritis, if not checked, causes a wasting away of the muscles supplied by the inflamed nerve. This is not true of neuralgia. Thin blood and lowered vitality, alcoholism and pressure on a nerve are some of the causes of neuralgia. Anemic people are especially subject to it, and the remedy in such case lies in building up the system. Facial neuralgia is sometimes caused by infections in the teeth or nose, and when these parts are treated properly, the pains disappear. Those subject to neuralgic pains should avoid exposure to cold and dampness, take necessary rest, and eat nourishing food and avoid mental strain. Drugs should not be used unless prescribed by a reliable physician. See *Trio Douleur*.

NEURASTHENIA, *nu ras the'ma*, or general exhaustion of the nervous system, is a common ailment in civilized countries. It comes as a result of continuous strain or excess of any sort. Overwork produces a large proportion of the cases, but excessive use of tobacco and stimulants or vicious habits of any sort are causes. The disease affects the sexes about equally and is usually chronic, because the causes which produced it have been long standing and the restoration of power in the nerves themselves is always a slow and difficult process. The symptoms of neurasthenia are varied, the functions of almost every organ may be affected by it and may show their weakness by the symptoms which are characteristic of diseases of that organ. Nervousness, irritability, loss of sleep and impaired digestive functions are always present to a greater or less degree. When there are no organic diseases connected with it, neurasthenia may be cured, especially in its earlier stages, if the causes are removed and proper attention is given to diet and rest. Rest and freedom from care and worry, in

connection with active out-door life, are the best remedies.

NEURITIS, *nu rī'tis*, inflammation of a nerve which generally manifests itself by severe pain. It commonly attacks the nerves of the arm and hand. If the disease is not checked the parts become numb, and the muscles lose their power of action. Neuritis of the optic nerve is a cause of blindness. Nerve inflammation may be caused by injury, infection, exposure to cold or overstrain. Some forms yield to massage treatment, but nearly all cases need the attention of a physician.

NEUROPTERA, a large order of net-winged insects. It includes alder flies, snake flies, dusty wings, ant-lions, aphid lions, and golden-eyed, lace-winged flies. All are carnivorous and feed on other insects. Some are aquatic, but most of them live on land. The wings are four in number, and are crossed by numerous veins. The head is large, and the antennae slender. Although having certain points of resemblance, the various families differ markedly in structure and in life history.

NEURO'SIS, a general term applied to various disorders of the nervous system, in which there is no alteration of structure, but a number of annoying or painful symptoms. To one class of neurosis the term *occupational* is applied. A familiar example is writers' cramp, contracted by those who use the pen to excess and who write under mental stress. Overwork of the muscle is the cause, and the symptoms are numbness of the hand and inability to write. Neurosis of the circulation, digestion and other functions are also common, and are usually the result of a morbid mental condition. Rest, freedom from worry and sane living are the best remedies for persons troubled with nervous disorders. See NERVOUS DISEASES.

NEUROTIC, *nu rō'tik*, a medical term employed with reference to nerves of the nervous system. As applied to a person, it means one who suffers from hysteria, neurasthenia or other nerve weakness. The word has been used to designate any drug having a tendency to produce certain effects upon the nerve centers.

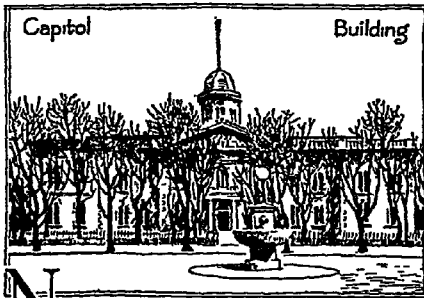
NEUTRALITY, *nu trāl'ē tē*, from the Latin *neuter*, meaning *neither*, a word describing the attitude of a nation which shows no preference by word or deed between other nations engaged in war. To be neutral is

to be an impartial observer, to help one antagonist in the slightest degree and refuse to do as much for its adversary as to violate neutrality and be confronted with the possibility of being drawn into the struggle.

When two or more nations declare war upon each other, the executives of all countries not involved issue to their people proclamations of neutrality, warning them what their conduct must be towards the belligerents. Sometimes neutrality is difficult to maintain, particularly if the sympathies of a whole people are almost entirely with one belligerent, and even more especially if the boundaries of a neutral nation touch those of a warring country. In the latter event it may become necessary to resort to *armed neutrality*. This may be explained by references to history still vivid in all minds. Switzerland touched the borders of both France and the German Empire during the World War (1914-1919); the Swiss army throughout the whole war guarded its frontiers, and would have repelled with force any acts of either belligerent which would have affected its neutral position. The same course was taken by Holland, whose borders touched Germany and Belgium.

Neutral nations may deal with countries at war, selling them any commodities they need, including munitions, if the same privileges are offered all belligerents impartially. However, a neutral nation may not sell a warship to a belligerent, neither can it allow its harbors to be entered by a warship of a warring power except for repairs, the time then permitted to be decided by the government of the neutral, and usually not more than twenty-four hours.

NEVA, a river of Russia which issues from Lake Ladoga at its southwestern end, and after flowing westward for forty-five miles discharges into the Gulf of Finland through several mouths. The city of Petrograd is built on islands in the river delta about ten miles from the Gulf. Connected through a system of canals with the Volga, the Neva is an important commercial route. It constitutes the most northerly section of the inland waterway connecting the Caspian Sea with the Baltic. The river contains a great volume of water, and in places its channel is over a half-mile wide. In some places extensive engineering works have been constructed, sometimes at great cost, to make it navigable.



NEVADA, one of the largest states in the American Union, only five being larger, but in population forty-eighth. Indeed, there are ninety-seven cities in the United States each containing more people than live upon the 110,690 square miles which comprise Nevada. Its population has fluctuated with the rise and fall of its mining interests. It nearly doubled between 1900 and 1910, but in the next decade it decreased five and one-half per cent. In 1920 there were 77,407 people, in 1930, 91,058, less than half the number required in other states to entitle them to one representative in Congress.

Nevada is called the **SILVER STATE**, because of the wonderfully rich mines of silver discovered there in 1859. California is on the west, Utah and Arizona are east, Oregon and Idaho are north, and Arizona and California are south.

Surface and Drainage The most of the state is in the area included within the great basin, and is the bed of an ancient sea whose shore lines can be distinctly traced in a number of places. This basin lies between the Sierra Nevada Mountains, on the west, and the Wasatch, on the east. The average altitude of the plateau is about 4,000 feet, and upon it mountains rise to altitudes varying from 1,000 to over 8,000 feet. The highest point in the state is Wheeler Peak, at about the center of the eastern boundary, its altitude is 13,058 feet. Distributed over the plateau and running principally in north and south directions, are numerous smaller mountain ranges, whose altitudes vary from 6,000 to 8,000 feet. In some sections there are also ranges extending approximately east to west. Many of the ranges contain passes, and others have been worn away so that only isolated peaks remain.

The state has but few rivers, and these are small. In the northern section the Owy-

hee flows into Snake River and thence to the Columbia. The Humboldt, rising in the northeastern part and flowing in a southwesterly direction for about 375 miles into Humboldt Lake, is the largest river. In the southeastern section a few small streams drain into the Colorado, which forms a part of the southeastern boundary. With these exceptions, the streams of Nevada find no outlet to the ocean. Most of them are mountain torrents, which disappear on reaching the lower levels, either in mountain lakes or in swamps known as *sinks*.

There are a number of lakes. Of these, Pyramid is the largest, with a length of thirty-five miles and a width of ten miles. Lake Tahoe, on the California boundary, 6,225 feet above the sea, is, because of its altitude, its great depth, the clearness of its waters and the remarkable beauty of its surroundings, one of the foremost of American mountain lakes, it is visited by a large number of tourists.

Climate. The climate is dry, mild and healthful. Severe winds seldom blow, the average temperature for January is about 28°, and for July, about 71°. The thermometer occasionally falls as low as 30° below zero and sometimes rises to 110° above, but these extremes seldom occur. The state is the most arid in the Union, the average rainfall being less than 12 inches, and this is very unevenly distributed as to time and locality. Most of the rain occurs between December and May, the northern counties receive double the amount received in other portions, while in many valleys and in the southern part of the state rain seldom falls. Irrigation systems are extensively employed.

Mineral Resources Nevada is preeminently a mining state, and its development was due to the rich deposits of gold and silver found in the mountains years ago. It was here that the celebrated Comstock Lode, which at one time produced over \$38,000,000 worth of bullion in a year, was discovered. Numerous other rich mines have also been located within the state, but when the most valuable deposits had been exhausted, the mining industry declined for a number of years. In the year 1902, however, several new mines were opened at Tonopah and Goldfield, and this revival of the industry lasted until 1919. Though there is considerable fluctuation, the annual output of gold is about \$5,000,000 and of silver about \$2,000,-

000 Lead, zinc, copper, quicksilver, nickel and tungsten are other metals which are produced in paying quantities

Besides the metals, there are extensive deposits of such minerals as borax, soda, silver, potash and rock salt, while marble, granite, alabaster, slate and other valuable building stones are found. Some lignite coal has been mined in Elko county and elsewhere.

Agriculture. The lack of rainfall and the distance from markets prevent agriculture from being largely developed. The soil is generally fertile, and wherever irrigated, it produces abundant crops of hay, cereals and harder fruits, such as apples, pears and cherries. Along the valley of the Humboldt and the Carson rivers and throughout the west central portions of the state, there are large tracts of irrigated land, and numerous farms are found in these regions. In other sections, where there is an abundance of prairie grass, stock raising has become an industry of some importance. The mild climate enables stock to roam without shelter during the winter, and large numbers of cattle and sheep are raised.

Nine-tenths of the agricultural land of Nevada is irrigated soil; there are over 3,150 miles of irrigation ditches. One of the greatest irrigation projects in the United States is the Truckee-Carson dam (see IRRIGATION)

Manufacturing. The manufactures are few. The most important are connected directly or indirectly with mining, being the smelting and refining of ores and the making and repairing of such machinery and tools as are needed for mining purposes. There are a few local industries, such as flour and grist mills and car repair shops.

Transportation. Nevada has about 2,500 miles of railway. The Southern Pacific and the Western Pacific cross the northern portion of the state, a branch of the Union Pacific crosses the southern part, but the greater portion is without railway communication and depends upon motor transportation.

Education. Considering its sparse population, the state maintains an excellent school system, but at a large expenditure per capita. There is a State University, inclusive of an agricultural experiment station and the Mackay School of Mines, and the State Normal School at Reno. There is a mining school at Virginia City, and normal schools at Eureka, Tonopah and Yerington.

Items of Interest on Nevada

A bill providing for the use of lethal gas in executing the death penalty in Nevada was signed in March, 1921, by the governor. This act abolished other forms of capital punishment in the state.

The average size of farms is nearly 1,000 acres.

Stock-raising takes first place among agricultural pursuits, live stock is valued at over \$13,000,000 a year.

Its mineral wealth alone makes Nevada important; the mines in the Comstock district have produced upwards of \$220,000,000 in gold and \$250,000,000 in silver.

A second great discovery of minerals took place in 1900 near the city of Tonopah, and after 1902 the gold and silver production steadily increased, the average annual output of gold is valued at about \$5,000,000, and of silver at \$2,000,000.

The state's average output of copper is valued at \$3,500,000, and of lead, \$1,000,000. Zinc is produced in paying quantities.

In the production of the valuable mineral tungsten, Nevada ranks first among the states.

A new city, Boulder, laid out on modern lines, has been built on the west bank of the Colorado River, adjacent to the great Boulder Dam. It was constructed by the dam contractors to provide workmen's homes.

Questions on Nevada

What is the area?

What is its population? How does it rank in population?

What is the character of its surface? Name five rivers flowing wholly or partly in the state.

What is the average size of farms?

What and where is the Comstock lode?

What is the present annual average value of gold and of silver mined in Nevada?

Name six other minerals found.

In the production of what mineral does Nevada take first rank?

Institutions. The state maintains a hospital for the insane at Reno, an orphan's home and a state prison at Carson, and an industrial school at Elko. The deaf, dumb and feeble-minded are cared for under state contract in California.

Cities. The largest town in the state is Reno, with a population of 18,529 (1930). Carson City is the capital. Goldfield and Tonopah are in the southwestern section, and Las Vegas and Boulder in the extreme southern end of the state. There are numerous small towns in the mining districts.

Government. The legislature is composed of two branches and the membership of both cannot exceed seventy-five. The senate cannot have less than one-third nor more than one-half as many members of the assembly. Members of the assembly are elected for two years, and of the senate for four years. The legislature meets biennially, and the session is limited to sixty days. The executive department consists of a governor, a lieutenant-governor, a secretary of state, a treasurer, a comptroller, a surveyor-general, an inspector of mines and an attorney-general, each elected for four years. The courts include one supreme court and a number of district courts, below which are the justice courts and certain special courts of cities and towns.

History. Nevada was first visited by Spanish friars about 1775. After 1825 trappers entered the region, and Fremont crossed it on his way to California in 1843. It was a part of the territory ceded to the United States by Mexico, by the Treaty of Guadalupe Hidalgo, February 2, 1848, and it was constituted a territory in 1861, with somewhat smaller boundaries than at present. Its area was gradually increased until 1866. Nevada was admitted into the Union as the thirty-sixth state on October 31, 1864. Although the Mormons had established a camp in the region in 1848, its real history begins with the discovery of silver there in 1859.

The state has been unfortunate in the decline of silver production, but since 1900 new gold fields and copper mines have directed renewed attention to Nevada. Some progressive legislation has marked the last decades. The initiative and referendum are in force, eight hours constitutes a day's work for women, merchants cannot use trading stamps to attract business unless they pay a

tax of \$2,000 yearly, automobilists must file with the state an indemnity bond as security in case of accidents.

Nevada has a small bonded debt. It derives its revenues from normal property taxes. It imposes neither income taxes, inheritance taxes nor a sales tax.

Related Articles. Consult the following titles for additional information:
Carson City Nevada Uni- Reno
Irrigation versity Virginia City

NEVADA, UNIVERSITY of, a state university, established in 1886 at Elko, and now located at Reno. It is at the head of the educational system and is the only school in the state of collegiate grade. It maintains courses in arts and science, education, agriculture, civil, mechanical and mining engineering and domestic science. The courses in mining engineering are admirable, as the Mackay family have contributed generously to that department. Reno is also situated in a region affording excellent research material, especially in mining engineering, on account of its proximity to the great mining districts of the state. About one-half of the students are women. The faculty numbers about seventy, and there are more than 900 students.

NEVIN, ETHELBERT (1862-1901), an American composer, born at Edgeworth, Pa. He studied under the best instructors in America and Germany and, returning to his native country in 1887, devoted himself to composition. In 1900 he became an instructor of music in Yale University. He composed many songs and instrumental pieces, including a large number of waltzes. His work is characterized by fine melodic quality, delicacy and originality. Most famous of all his songs is *The Rosary*.

NEW ALBANY, IND, the county seat of Floyd County, on the Ohio River, opposite Louisville, Ky., and on the Southern, the Baltimore & Ohio, the Chicago, Indianapolis & Louisville, the Pennsylvania and the Kentucky & Indiana Terminal railroads. The city has a public library, a city hall, a post office and custom house, and large fair grounds. It is two miles below the falls in the river and has good water power. The industrial establishments include manufactures of veneer, men's clothing, automobile bodies, leather, fertilizer, stoves and stokers, glue, foundries and other factories. The place was laid out in 1813, and was made a city in 1839. Population, 1930, 25,819.

NEWARK, N. J., the largest city in the state and eighteenth in size in the United States, and the county seat of Essex County. It is situated on Newark Bay and on the Passaic River, eight miles from New York City. Its area is 23.57 square miles. It is served by the Central Railroad of New Jersey, the Delaware, Lackawanna & Western, the Erie, the Lehigh Valley, the Pennsylvania, the Reading and the Baltimore & Ohio railroads, 50 bus lines operate in or pass through the city. It is a centering point for the most modern system of state and national highways including the Lincoln Highway.

It is one of the most important Atlantic seaports. The Port of Newark terminal, situated on Newark Bay, is a municipal development costing over \$18,000,000. Ocean-going traffic enters through the deep water channels in Newark Bay and the Passaic River. Many docks for the lighterage service connecting with New York lines handle freight for both railroads and steamships. Newark Metropolitan Airport handles a larger volume of transport than any other airport in the world, this is the air-mail and passenger service terminus for the New York area and the East. Tunnels and high-level bridges make travel to and from Manhattan a matter of minutes.

The volume, diversity and quality of the city's manufactured products are far-famed, there are about 640 industrial establishments. Their records surpass all other records of production per square mile of city area. Here is the state's principal retail trading center. Nearly half of the state's population of 4,000,000 is contained within a 10-mile radius from the center of the city. Newark ranks as fourth city in the United States in number of home-office insurance companies. Several of its banks are the largest in the state.

About 95,000 pupils attend the public and parochial schools. For higher education the city has the College of Engineering, the New Jersey Law School, the State Normal School, the New Jersey College of Pharmacy, and the Mercer-Beasley School of Law. The public library contains 500,000 volumes. Other institutions and buildings of interest are the Old First Church built in 1666, the original site of Princeton University known in 1748 as the College of New Jersey, Trinity Cathedral built in 1743, the Newark museum, the public baths, Newark Stadium, the city hall

building group, the Aaron Burr homestead, and Newark Academy founded in 1768.

The Essex County park system includes more than 4,000 acres, much of this area lies in attractive mountain sections, but six parks of the system with 900 acres are within Newark. In addition the city maintains 36 parks and squares besides golf courses, tennis courts and base ball fields.

The city was founded in 1666 by a band of Puritans from Connecticut led by Captain Robert Treat. It was incorporated in 1836 as a city. Because of the revolutions of 1848 in Europe many oppressed people, largely Germans, migrated to Newark. The flexible film from which developed the moving picture film was invented in Newark in 1887. The city is governed by a commission. Population, 1930, 442,337.

NEWARK, OHIO, the county seat of Licking County, 33 miles east of Columbus, on the Licking River and the Baltimore & Ohio and Pennsylvania railroads. Shops, offices and freightyards of the Baltimore & Ohio railroad are the principal commercial enterprise. Manufactures consist of stoves, glass, freight cars and automobiles. In and near the city are extensive remains of the Mound Builders. In the surrounding territory are deposits of natural gas, coal and sandstone. Newark was settled in 1801. Population, 1930, 30,596.

NEW BEDFORD, MASS., one of the county seats of Bristol County (Taunton being the other), 56 miles south of Boston, and 229 miles from New York City. It is situated at the mouth of the Acushnet River, on New Brunswick Harbor which is an arm of Buzzard's Bay, and on the New York, New Haven & Hartford railroad. Steamboat lines connect with New York City and with Gulf and Pacific Coast ports.

For over a hundred years New Bedford held the distinction of being the greatest whaling port in the world, but since 1860 the industry has steadily declined. Some 200 industries are in operation and the city is a prosperous manufacturing center. The cotton mills alone normally employ over 32,000 workers, other factories make silk dress goods, blankets, yarns, fine tools, screws, overalls, cloth caps, boxes, soap, toys, electrical devices, and tire fabrics.

The educational institutions include 39 public schools, the Vocational School, the Textile School and the Swan Free School of

NEW BRUNSWICK, NOVA SCOTIA AND PRINCE EDWARD ISLAND



1 Fishing Scene

3 Falls and Lumber Mill
4 Fruits and Vegetables

5, Iron and Steel Works
6, Terminal Railway Docks at Halifax

Design. The library contains over 160,000 volumes. More than 70 churches and 25 public and private welfare societies are maintained.

Gosnold visited the site of the city in 1602, a village was established in 1760, incorporation as a town occurred in 1787, the city charter was granted in 1847. During the Revolution many privateers were sent out and the town became a refuge for captured prizes. The whaling industry began after 1765, the first cotton mill began operations in 1847. Population, 1930, 112,597.

NEW BRITAIN, Conn., in Hartford County, 10 miles southwest of Hartford, on the New York, New Haven & Hartford railroad, an important manufacturing center. The area of the city 13 square miles, 854 acres are devoted to parks. It is the seat of the State Teachers College and of a state trade school. The public library contains 100,000 volumes. There are 33 churches. The 89 industrial establishments produce goods valued at \$40,000,000 annually. Household appliances, saddlery hardware, ball bearings, knit goods, cloaks and suits and builders' hardware. Of the population 69 per cent are native born, foreign residents are predominantly Polish, English, German, Swedish, Italian and Irish. Population in 1920, 59,316, in 1930, 68,124, a gain of about 15 per cent in 10 years.

NEW BRUNSWICK, *brunz'wik*, one of the eastern provinces of the Dominion of Canada, lying to the east of Maine and Quebec. The Bay of Fundy, famed for its high tides, separates it from Nova Scotia on the south, the Gulf of Saint Lawrence, Northumberland Strait and Prince Edward Island are east, Quebec and Chaleur Bay are north. The greatest extent from north to south is about 215 miles, and from east to west, a little less. The area is 27,985 square miles, which is about 5,000 square miles less than that of its neighbor, Maine. The province has about 550 miles of coast line, which contains a number of good harbors. Population, 1931, 408,219.

Surface and Drainage. The Eastern part of the province, bordering on the Gulf of Saint Lawrence, is low, and the coast is marshy, but the southern coast, bordering on the bay of Fundy, is high and contains numerous bluffs. A branch of the Appalachian highlands entering the province from Quebec at the northwest corner extends

southeasterly to the middle of the province. These highlands form the source of many rivers and their tributaries which flow into the coast waters on the northern, eastern, and southern sides of the province. These highlands are of but low elevation, nowhere attaining a height of more than 1,500 feet, with the exception of a few separate peaks which rise from 2,000 to 2,500 feet. In general, the surface of the province is that of an undulating plain.

The St. John River is the principal river, draining nearly half the province on the west. It rises in Maine, forms for 80 miles the boundary, then after entering the province, narrows and leaps over a precipice eighty feet high. This leap is known as the Grand Falls. Hydro-electric power is developed here. In the lower course of the river and in some of its tributaries are lake expansions. After receiving these tributaries, the river narrows to a gorge of less than 500 feet, through which the river empties into St. John harbor. Since at low tide the water level of the harbor is 12 to 14 feet lower than that of the river, there is a fall, but as the tide rises in the harbor there is a short period of level water between the harbor and the river, then as the tide continues to rise 10 or 12 feet higher, the fall is from the harbor to the river. The falls are known as "Reversing Falls." This phenomenon is so rare that there is probably no other like it in the world.

Climate. New Brunswick is subject to severe winters and hot summers, although along the coast the changes are not as extreme as in the interior. During the winter the thermometer occasionally falls as low as 30° below zero, and in the hottest summer months it sometimes rises as high as 95°. The coast regions are subject to fogs during portions of the year, but on the whole the climate is healthful, and the extremes of heat and cold cause little suffering, especially in the interior, because of the dryness of the atmosphere. The annual rainfall is a little over forty inches.

Mineral Resources. Some coal of an inferior quality is found in the eastern and south-central sections, but it is not mined to a great extent. There are also deposits of nickel, antimony, manganese and iron ore among the metals, while graphite, gypsum, limestone and a variety of stone suitable for whetstones and grindstones are found in pay-

ing quantities Natural gas was found in 1911, and New Brunswick is now an important Canadian gas field

Agriculture The soil of the lowlands and along the streams is highly fertile, and the climate is well suited to the growing of all crops which can be raised in a cool temperate climate; consequently, these regions are all occupied by farms, but in the uplands and hilly portions of the province the soil is less fertile and yields but slight return to the husbandman Originally nearly the entire province was covered with forests, which included both hard and soft woods Among the soft woods, spruce, pine, tamarack and fir predominate, only a limited portion of the forests has been cut, hence much of the land is still untitled The chief crops are hay and forage, buckwheat, barley, wheat, oats and potatoes Turnips and other root crops are grown, and in some sections dairying and the raising of live stock are important branches of agricultural industry Small fruits are raised in large quantities and marketed in New England cities In the St John Valley are great apple orchards

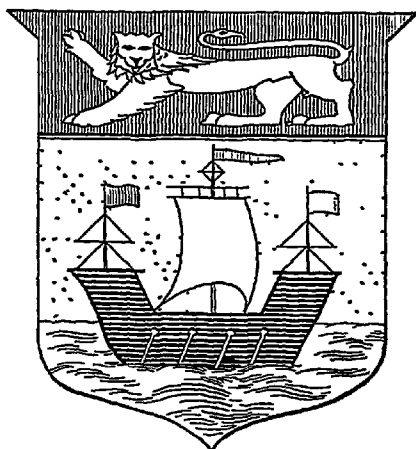
Other Industries The fisheries are valuable and furnish occupation for a large num-

ber of good harbors, and there is steamer connection with Portland, Boston and other important cities on the Atlantic coast of the United States The Canadian National and Canadian Pacific railways also traverse the province, the former through the eastern portion and the latter through the western These two great railway systems also join New Brunswick with the great provinces in the West Each of these lines has branches extending to important manufacturing and trade centers, a cross line from Fredericton to Newcastle connects the two systems, so that the province is fairly well supplied with railway facilities, the entire mileage amounting to about 2,100 miles

Transportation. Each coast has a number of good harbors, and there is steamer connection with Portland, Boston and other important cities on the Atlantic coast of the United States The Canadian National and Canadian Pacific railways also traverse the province, the former through the eastern portion and the latter through the western These two great railway systems also join New Brunswick with the great provinces in the West Each of these lines has branches extending to important manufacturing and trade centers, a cross line from Fredericton to Newcastle connects the two systems, so that the province is fairly well supplied with railway facilities, the entire mileage amounting to about 2,100 miles

Education The public school system is controlled by an educational council, of which the provincial superintendent is the head There are no separate schools for Catholics and Protestants, as is true in Quebec The courses of study, the methods of instruction and the text-books are uniform throughout the province, and in addition to the elementary schools, normal schools are maintained The province also provides for those students who wish to pursue a course of study at the University of Fredericton There are a number of denominational colleges Of these, Allison College (United Church) at Sackville is the largest

Institutions. There is a general hospital at Saint John, also an industrial home for boys, besides institutions for the deaf and dumb Hospitals for the insane are maintained in different parts of the province There is no penitentiary, but convicts are sent to the Dominion penitentiary at Dorchester, maintained for the maritime provinces The Provincial Museum is at Saint John



COAT OF ARMS OF NEW BRUNSWICK

Many years ago, in the days of wooden sailing vessels, New Brunswick was one of the world's leaders in shipbuilding The province, then a separate colony, was noted for its ships and its commerce Of those days the coat of arms is a symbol The British lion, above, is the sign of loyalty to and union with the Empire

ber of the inhabitants On both the Gulf and Bay of Fundy coasts, large numbers of cod,

Items of Interest on New Brunswick

The St John River, which rises in Maine, is over 450 miles long, and is navigable for vessels of moderate tonnage from the city of Saint John to Fredericton

The Bay of Fundy has a length of 140 miles and an extreme width of forty-five miles

There are nine universities and colleges in this small province of less than 28,000 square miles

The Bay of Chaleur is ninety miles long

The provincial government has set aside a tract of 10,000 square miles as a national park and game preserve

The recent law permitting the shooting of stray dogs without liability and the increased use of woven instead of barbed wire for fences is largely responsible for the increase in the number of sheep

The highest point in the province is Bald Mountain, 2,604 feet

There are about 875 manufacturing establishments in the province

There are 1,635 Indians under the control of the agencies

There are eleven Indian schools, with a total attendance of about 200, these schools are all Catholic

The largest cities are Saint John, Moncton, Fredericton, Campbellton and Edmundston

There is little immigration (about 1,000 a year), but a steady emigration to the western provinces and to the United States

Questions on New Brunswick

Compare the areas of New Brunswick and Scotland Of New Brunswick and Saskatchewan

What is the highest point in the province?

Where is the Bay of Fundy? The Bay of Chaleur?

What are the leading crops?

Is dairying an important industry?

What can you say of the growth in sheep ranching?

What is the principal product of the fisheries?

Cities The two chief towns are Fredericton, the provincial capital, and Saint John, on the Bay of Fundy Next in importance is Moncton

Government and Religion The executive department of the government consists of a lieutenant-governor and a council of seven members The lieutenant-governor is appointed by the Governor-General of Canada, with the advice of his Council, for a term of five years The legislature consists of a house of assembly of forty-eight members, elected for five years All local administration is through the county councils

The inhabitants are largely of English, Scotch, and Irish descent, and in religion they are divided between Catholicism and Protestant denominations, the Roman Catholic Church having about one-third of the membership Among the Protestant denominations, the Anglican Church, Presbyterians, the United Church and Baptists lead

History New Brunswick was discovered by Sebastian Cabot in 1498, and with Nova Scotia formed the French colony of Acadia, which continued from 1604 to 1713, during which time it was alternately a possession of the French and the English In 1713, by the Treaty of Utrecht, it became a British province, but the boundaries were not determined until the Treaty of Paris, which closed the French and Indian wars In 1755 a large number of the French inhabitants were compelled to leave the province because of their sympathies with the French In 1784 Nova Scotia was detached, and New Brunswick became a separate province

At the formation of the Dominion of Canada in 1867, it entered the federation Separate schools for Protestants and Catholics were abandoned in 1871, after a hard struggle The province has a public utilities commission for the regulation of rates of companies which serve all the people

Related Articles Consult the following titles for additional information

Chaleur Bay	Moncton
Fredericton	Saint John
Fundy, Bay of	Saint Lawrence, Gulf of

NEW BRUNSWICK, N J, the county seat of Middlesex County, thirty miles southwest of New York City, at the head of navigation on the Raritan River, on the Delaware & Raritan Canal and on the Pennsylvania and the Raritan River railroads A fine bridge spans the river The city is the seat

of Rutgers University and its affiliate, New Jersey College for Women, and the Theological Seminary of the Dutch Reformed Church. There is a public library, the Sage and Gardner libraries, Saint Agnes Academy and homes for orphans and the aged. The place was settled as Prigmore's Swamp in 1681 and was known as Imon's Ferry from 1697 to 1714, when it was named in honor of the British House of Brunswick. It was chartered as a city in 1784. In the Revolution it was the scene of numerous conflicts and was held by the British during the winter of 1776-1777. The commission form of government has been adopted. Population, 1920, 32,779, in 1930, 34,555, a gain of 5.4 per cent.

NEWBURGH, N. Y., in Orange County, sixty miles north of New York City, on the Hudson River, five miles above the Highlands, and on the Erie and the West Shore railroads. The manufactures include cotton, woollens, silks, paper, hats, carpets, furniture, leather, and fabricoid. The municipality has a public library, a park, Saint Luke's Home and Hospital, a home for the friendless and a home for children. Hasbrouck House, occupied by Washington for a time during the Revolution, is now used as a museum for war relics. The revolutionary army was disbanded here, and a large stone structure, known as the Tower of Victory, has been erected by the Federal and state governments to commemorate the successful termination of the war. The place was settled by German Lutherans in 1709, was made a village in 1800 and was chartered as a city in 1865. The town is governed on the commission and city manager plan. Population, 1920, 30,366, in 1930, 31,275, a gain of 3 per cent.

NEWBURYPORT, MASS., one of the county seats of Essex County, thirty-seven miles northeast of Boston, on the Merrimack River, and on the Boston & Maine railroad. The city has a good harbor, and contains manufactures of boots, shoes, cotton cloth, silverware, machinery, hats and other articles. There is a public library, a marine museum, the Putnam Free School, Anna Jaques Hospital, the Dexter House and homes for old ladies and children. Other places of interest are the house in which William Lloyd Garrison was born, the Old South Church, which contains the remains of George Whitefield, Washington Park, and a suspension bridge.

The place was settled in 1635, was incorporated as a separate town in 1764 and chartered as a city in 1851. Population, 1920, 15,609, in 1930, 15,084.

NEW CALEDONIA, an island in the Pacific, 850 miles east of Queensland, Australia. It is the southernmost of the Melanesian group, and belongs to France. It is 240 miles long, about thirty miles wide, and has an area of about 7,600 square miles. The interior is mountainous and is rich in nickel, gold, copper, lead, cobalt, silver and coal. The island is almost entirely surrounded by a coral reef, five to ten miles from the shore, affording a calm waterway for vessels. The natives, Melanesians, called by the French Canaques, are the best farmers in Oceania. The principal agricultural products are coffee, maize, sugar, tobacco, copra, grapes, cassava and pineapples, wheat and cotton. The island is administered by a governor. Numea, the capital, is the chief port. Population, 50,608.

NEW CASTLE, IND., the county seat of Henry County, forty miles southeast of Indianapolis, on the Blue River and on Lake Erie & Western, the Big Four, the Fort Wayne, Cincinnati & Louisville and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads. The leading manufactures include bridge work, sheet iron, steel, furniture, automobiles, and numerous other articles. The Indiana village for epileptics is two miles from the city. Population, 1920, 14,458, in 1930, 14,027.

NEWCASTLE, new'kas'l, New South Wales, a shipping port on the Hunter River, 102 miles north of Sydney, with which it is connected by rail. It is the chief port for the northern region of New South Wales and is the most important coaling station in the Southern hemisphere. The trade in coal, wool and frozen meats is considerable, and there are copper smelters, foundries, boat factories, carriage works, shipbuilding yards and a steam biscuit factory. The city is well built and progressive. Newcastle is the seat of a United States consul. Population, 1933, 104,740.

NEWCASTLE, PA., the county seat of Lawrence County, fifty miles northwest of Pittsburgh, at the confluence of the Shenango and Neshannock rivers, on the Pennsylvania, the Erie, the Baltimore & Ohio, and the Pittsburgh & Lake Erie railroads. There is a well-equipped airport, on the Newcastle-Youngs-

town road, and there is daily motorbus service between those two cities. The city is in an agricultural district, which also contains deposits of coal, limestone, sandstone, fire clay and iron ore. There are nearly 100 factories, the principal products are glass, brick, tin plate, steel, Portland cement, radiators, strip steel, machinery and cans. Cascade Park is a popular resort. The Y. M. C. A. maintains a public library, there are also two hospitals, Odd Fellows' and Elks' buildings, a city hall, a Scottish Rite Cathedral seating 3,500, three high schools, and a Y. W. C. A. The place was settled in 1812, was incorporated as a borough in 1869, and was chartered as a city in 1875. Mayor and council form of government prevails. Population, 1930, 45,674.

NEWCASTLE-UPON-TYNE, ENGLAND, a river port and parliamentary borough in the County of Northumberland, on the left bank of the River Tyne, about sixty miles northeast of Liverpool. Located in the midst of one of the largest coal fields in England, it ships out immense quantities of this commodity, a circumstance which has given rise to the expression, "carrying coals to Newcastle," as symbolic of utterly useless labor. Because of its shipping facilities and its location in a rich mineral district, Newcastle has developed as a prosperous industrial and commercial center. It has manufactures of glass, soda, fire brick, chemicals and other commodities, shipbuilding yards, ordnance works and potteries, and one of the largest meat and vegetable markets in Great Britain. Its locomotive and engineering works are mammoth plants, and in this city the English railway system originated.

Newcastle has many notable buildings and educational institutions, including the science and medical colleges of Durham University, Rutherford College, an art gallery, a natural history museum and a public library. The city dates the time of Emperor Hadrian of the Roman period. Its name refers to a castle built in the eleventh century by a son of William the Conqueror. Population, 1933, estimated, 286,500.

NEWCOMB, *nu'kom*, SIMON (1835-1909), an American astronomer and mathematician, born in Nova Scotia. He emigrated to the United States at the age of thirteen, and in 1858 was graduated from the Lawrence Scientific School at Harvard. In 1861 he was appointed professor of mathematics in the

United States navy and assigned to duty at the Naval Observatory. He was secretary of the commission which observed the transit of Venus in 1874 and in 1882, the latter from the Cape of Good Hope. In addition to this he directed the observations of several eclipses. In 1897 he retired from the navy and afterwards devoted himself to scientific pursuits. He was editor of the *American Journal of Mathematics*, professor in Johns Hopkins University and a member of



SIMON NEWCOMB

numerous royal academies and scientific associations of Europe and America. In many of the American associations he has held the position of president or other important offices, and in 1904 he was president of the International Congress of Arts and Sciences which convened at Saint Louis. He was recognized as the leading authority in his field. Among his important scientific works are *An Investigation of the Orbit of Neptune*, *Researches on the Motion of the Moon* and *Measure of the Velocity of Light*. Besides these, he has written a number of books for laymen. Among these are his *Popular Astronomy*, *School Astronomy*, *The Stars*, *Astronomy for Everybody* and *Reminiscences of an Astronomer*.

NEW ENGLAND CONFEDERATION, a union formed by the colonies of Plymouth, Massachusetts Bay, Connecticut and New Haven in 1643, under the title *United Colonies of New England*. Its purpose was to secure united action for protection, whether against the Indians, the Dutch, the French or the mother country. During the first twenty years of the union, the confederation was an important force in the colonies, but after that time it rapidly declined, owing to factional disputes and the weakness of its constitution, and in 1684 it went out of existence.

NEWFOUNDLAND, *nu'fund land*, until 1917 a colony of Great Britain, from 1917 to 1933 it was the Dominion of Newfoundland. It was raised to this distinction because of the gallantry of its overseas forces.

in the World War Attached to Newfoundland politically is Labrador, on the mainland, its area is 110,000 square miles

Newfoundland is an island on the eastern side of the Gulf of Saint Lawrence, roughly triangular in form, with an area of 42,734 square miles—slightly greater than that of Ohio The shores of the island are nearer to Ireland than any other point on the North American continent, the distance being only 1,640 miles The narrow Strait of Belle Isle separates it from Labrador

The People. The inhabitants are descended from the original immigrant fisher folk who early came from England, Scotland and France There is now but little immigration—about 8,000 per year, indeed, the emigration is fully as great The population of 285,675 (in 1934) is settled almost entirely along the southern coast, the interior is practically uninhabited These figures do not include Labrador whose population is 4,400

The capital is Saint John's (43,175 pop). Harbor Grace has 3,825, Bonaville, 4,052, Carbonear, 3,320, Twillingate, 3,217

Surface and Climate. Nearly all the island has a rough surface, though only a part is mountainous, and the elevations are not great The southwestern coast line is in many places precipitous, some of the elevations reaching 2,000 feet A few miles back from the ocean the land spreads back to the interior as an uneven tableland Some of it is barren, and a considerable part is heavily forested, but there is a considerable area of swamps, with many lakes and rivers

Contrary to general belief, the climate is not so severe in winter as in some parts of the Dominion of Canada, the surrounding water tending to modify it For the same reason the summers are much cooler than in Canada The thermometer never records a summer temperature as high as 85°; the average winter temperature at Saint John is 7°. The northeast coast, however, is always colder, owing to the influence of the Labrador Current, which flows southward along that shore from Arctic regions

Industries. The Grand Banks of Newfoundland are the richest cod-fishing locations in the world, this is the reason that so great a proportion of the people are fishermen The export of fish products amounts to about \$15,000,000. The total trade of the Dominion is over \$55,000,000

The lumber industry is conducted only to furnish material for paper and pulp; no lumber is exported There are great paper mills in Newfoundland owned by Lord Northcliffe, to supply paper for his large number of newspapers and magazines in England.

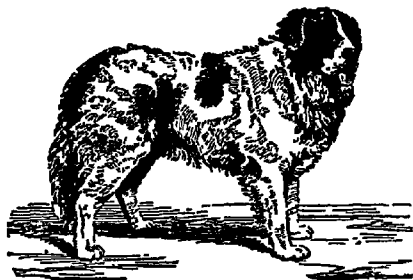
The government is encouraging the people to turn more largely to agriculture, for there are 5,000,000 acres of land suitable for farming. Only hardy crops can be grown, potatoes and turnips are leading products

Newfoundland is rich in minerals Copper is mined profitably, and there are deposits of silver, iron, lead, coal, marble, granite and gypsum The mines are being gradually made productive

Government and History In 1933 the Dominion Constitution was suspended, temporarily, because of financial distress, joint rule, under a local and British commission, responsible to London, was substituted

It is supposed that Newfoundland was discovered about the year 1000 by the Northmen It was rediscovered by John Cabot in 1497, and in the following century the English took possession of the island, it is therefore Britain's oldest possession in North America A struggle for supremacy took place between the English and the French, and this interfered with the establishment of permanent settlements on the island In 1713 Newfoundland and its dependencies were declared by the Treaty of Utrecht to belong wholly to Great Britain, the French reserving a right to fish on certain parts of the coast Responsible government was granted in 1833, and it remained under a colonial form of control until 1917.

NEWFOUNDLAND DOG, a large, hand-



NEWFOUNDLAND DOG

some dog, introduced from the island of Newfoundland It is usually black or black

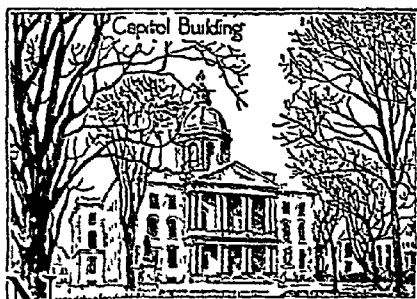
and white in color, with large, drooping ears and bushy tail, and in general appearance it is very imposing. It is a splendid water dog, takes to the sea at an early age and has often saved the lives of human beings in danger of drowning. In Newfoundland these dogs are used as beasts of burden and haul wood and provisions on sledges. On account of its great size, its intelligence and its bravery, the Newfoundland dog makes a fine watch dog. Few of the breed are left in Newfoundland, but there are many specimens in Great Britain and the United States.

NEW GLASGOW, NOVA SCOTIA, in Pictou County, on the East River and the Canadian National Railway. The plants of the Nova Scotia Steel and Coal Company and the Eastern Car Company each employ about 1,200 men. Other establishments produce glass, agricultural machinery, bridges, bricks, mineral waters, steel and wire fencing, lumber and mill products. Besides coal, the district yields limestone, iron ore, spruce and some hardwoods. Population, 1931, 8,558.

NEW GUINEA, *gu'ee*, next to Greenland, the largest island in the world, having an area of about 310,000 square miles. It lies in the Western Pacific Ocean, eighty miles north of Australia, from which it is separated by Torres Strait. At the time the World War began New Guinea was owned by three European nations, Great Britain, the Netherlands and Germany. The British territory, covering 87,786 square miles, and having an estimated population of 276,000, occupies the southeastern part of the island. Kaiser-Wilhelmsland, in the northeast, had an area of 70,135 square miles and an estimated population of 531,000. This region was occupied by Australian forces in October, 1914 and the Germans were driven out. The western part of New Guinea is held by the Netherlands, and has an area of 151,759 square miles. Its estimated population is 200,000.

British New Guinea is governed as a part of Papua, which is one of the territories of the Australian Commonwealth. The territory of Papua is made up of New Guinea and a number of near-by islands. In British New Guinea the land is gradually coming under cultivation, and coconuts, rubber, sisal hemp and tobacco are raised in profitable quantities. There are three ports of entry, Samarai, Darn and Port Moresby, and between the latter and Sydney there is

regular steamship service. Dutch New Guinea belongs politically to the East Indian outpost province of Ternate. Christian missionaries have done considerable educational work in the island.



NEW HAMPSHIRE, an American commonwealth in the New England group of states, among which it is third in size. New Hampshire was one of the original thirteen states, and was the ninth to ratify the Federal Constitution, thus making that document the fundamental law of the nation. Its popular name, **THE GRANITE STATE**, was bestowed in reference to its granite mountains.

Location and Area. New Hampshire touches the Canadian province of Quebec on the north, and is bounded on the west and south by Vermont and Massachusetts. The entire Vermont-New Hampshire boundary is formed by the Connecticut River. On the east New Hampshire adjoins Maine, except for a stretch of eighteen miles at the extreme south, where it is bordered by the Atlantic Ocean. Of all the Atlantic states, New Hampshire has the shortest coast line.

The state ranks forty-third in size among the American commonwealths, and its area of 9,341 square miles is about 200 square miles less than the area of Vermont, and about 1,000 square miles greater than that of Massachusetts. Included in this area are 311 square miles of water surface. In shape the state grows gradually narrower from south to north, its map suggesting a right-angled triangle.

The People. The population of the state in 1920 was 443,054, in 1930 it had grown to 465,293, ranking it forty-second in population among the states, with a density of 51.5 to the square mile. Only Vermont, among the New England States, has fewer inhabitants. About one-fourth of the

people are foreign-born, the predominating nationalities being Canadian (both French and British) and Irish. About sixty-three per cent of the people are of the Roman Catholic faith. Of the Protestant bodies the strongest are the Congregational, Baptist, Methodist and Protestant Episcopal. There are nine cities with populations exceeding 9,000, the first five, in order of size, are Manchester, Nashua, Concord (the capital), Berlin and Dover.

Surface and Drainage. The state is noted for its picturesque scenery. The White Mountains, occupying the north-central part, cover an area of about 1,400 square miles and constitute the most striking physical feature. They are a part of the Appalachian system and are divided by the valley of the Saco into two ranges, known respectively as the Presidential and Franconia ranges. The Saco valley, a narrow gorge with steep sides, is famous, and is known as Crawford Notch. There are a number of peaks whose bare, rocky summits rise above the tree line and so reflect the sunlight as to give them the appearance of snow-capped mountains. It is from this peculiarity that they received the name "White Hills," later changed to White Mountains. The Presidential Range has the highest peaks, the best known being Mount Washington (6,293 feet). Adams, Jefferson, Clay, Monroe and Madison are all over 5,000 feet in altitude.

The bases of these mountains are heavily wooded. They abound in deep valleys and narrow ravines, through which flow rushing streams. Many of these gorges are bounded by precipitous cliffs, some of which are more than 1,000 feet high. The most remarkable of these is the cliff overlooking a small lake in the Franconia Range, and containing a celebrated projection known as *The Old Man of the Mountains*. This is a profile formed by projecting rocks and measuring more than eighty feet from forehead to chin, bearing a striking resemblance to a human face. It is supposed that this profile was the foundation for Hawthorne's allegory, *The Great Stone Face*, though the valley does not exist as he describes it.

The Connecticut and its tributaries drain the western and northern regions, and the Merrimac and Piscataqua drain the southern and southeastern portions. The banks of the Merrimac are lined with factories, and this river is said to turn more spindles than any

other in the world. The mouth of the Piscataqua is a broad estuary. Numerous small lakes, noted for their beauty, are scattered over the state. Lake Winnepesaukee, in the south-central part, the largest, is nineteen miles long, over eight miles wide, and contains 264 islands.

Climate. New Hampshire has a typical New England climate. The winters are severe, and in the northern half snow usually falls to a great depth. The summers are mild and pleasant. The mean annual temperature at Concord is 48°. The annual precipitation is forty-five inches.

Minerals. The chief mineral products are mica, granite, feldspar and garnet. New Hampshire ranks high among the states in the production of granite, and is surpassed only by North Carolina in mica. The value of the granite output averages more than \$1,200,000 a year. Of other minerals worked, the most important are scythe stones, slate, limestone and brick clay. Mineral waters are found in various places. The total annual yield of mineral products is valued approximately at \$2,000,000.

Agriculture. In the river valleys the soil is well suited for farming, but much of the land is too stony to be worked to advantage. From one-sixth to one-fourth of the total area is under cultivation. The principal crops, in order of value, are hay, potatoes, corn, oats and tobacco. Among orchard fruits apples are the most important, and among small fruits, strawberries. Dairying and the raising of live stock and poultry are profitable branches of the agricultural industry. As in other New England states, one finds in New Hampshire many beautiful country estates in regions where farming has been abandoned.

Forests. Although much valuable timber has been cut from the virgin forests, New Hampshire is still an important lumber state. The White Mountains region is all forest-covered. Red spruce, in the yield of which New Hampshire is exceeded only by Maine, is the most important timber from a commercial standpoint, and is used extensively by the paper and wood pulp industries. The state ranks high in the production of white pine, though most of the cut is from the second growth. Other valuable woods include sugar maple, birch, beech, white oak and cedar. In 1916 the United States government purchased a tract of 5,000 acres in the

NEW HAMPSHIRE



State Seal

College Hall,
Dartmouth

Purple Lilac. State Flower

The
Great
Stone
Face

White Mountains, lying on the slope of the Presidential Range. The Federal government now has holdings in New Hampshire covering more than 270,000 acres of forest land, and it controls practically all of the peaks of the Presidential Range.

Manufacture The state enjoys the advantages of abundant water power, proximity to good markets and excellent transportation facilities, and the southern portion has developed into one of the most prosperous manufacturing regions in the United States. At the thirteenth census New Hampshire was outranked in New England only by Massachusetts and Rhode Island in the production of cotton goods, and among all the states it was seventh in rank. It ranked fourth in boot and shoe manufacture, eighth in the production of paper and wood pulp, and eighth in woolen goods. Manchester and Nashua are the chief factory centers. The

annual value of the manufactured products is in excess of \$400,000,000.

Transportation. Numerous railways traverse the valleys, and nearly every town of importance has ready access to one or more of these lines. The total railway mileage is over 1,200. The Boston & Maine owns or leases nearly 1,100 miles of the total mileage, and the Maine Central 100 miles. A third road, operating in the extreme north, is the Canadian National. The Mount Washington railway makes an ascent of 3,625 feet in two and three-fourths miles, and it is the first of its kind ever constructed. A state highway system has been fully developed.

Government The legislature consists of a senate of twenty-four members, distributed among twenty-four senatorial districts. The house of representatives consists of members apportioned according to population, all towns, cities and wards having 600 inhab-

Items of Interest on New Hampshire

New Hampshire is over seven times as large as Rhode Island, the smallest state, and about one-twenty-eighth the size of Texas.

The average density of population in 1930 was 51 5 per square mile

In 1933 there were fifty savings banks in the state, with over 275,000 depositors

An important occupation in the mountain region of the state is the entertainment of summer tourists

The navy yard at Kittery, Me, is known as the Portsmouth Navy Yard because Portsmouth is its port of entry.

The peace treaty between Russia and Japan was signed at Portsmouth in 1905

The White Mountains, famous for the beauty of the scenery, are sometimes called the "Switzerland of America."

Mount Washington is the second highest peak East of the Rockies, being exceeded in altitude only by Mount Mitchell, in the Black Mountains of North Carolina

Manchester ranks sixth among the cities of the Union that make boots and shoes, it also ranks fourth among the cities of New England as a producer of cotton goods, its factories turning out more than 300 miles of cloth daily.

The first bank in New Hampshire was chartered in 1792

Questions on New Hampshire

Describe the surface of New Hampshire.

What is the most remarkable feature of the Franconia Range of mountains?

What are the principal mineral products? Agricultural products?

How does the state rank as a producer of agricultural products?

Name the important manufacturing centers

What natural conditions favor manufacturing?

When and by whom was New Hampshire settled?

When did it ratify the Federal Constitution?

itants being entitled to one representative, and one for each additional 1,200 inhabitants, while districts having fewer than 600 inhabitants are entitled to a representative for a part of the legislative term corresponding to the ratio of their population to 600. The members of both houses are elected for two years. The executive department consists of the governor and a council of five members, elected by popular vote, and a secretary of state and a state treasurer, chosen by joint ballot of the senate and house of representatives

The judicial department consists of a supreme court, with a chief justice and four associate justices, a superior court, with a chief justice and four associate justices, probate courts and justices of the peace. There is a juvenile court law regulating the procedure for offenders under seventeen. The justices are appointed by the governor and confirmed by the council. A convention for the revision of the constitution may be called every seven years if two-thirds of the electorate vote to that effect

Education. The state law requires that at least thirty-six weeks of schooling a year be provided. The compulsory law requires attendance of children from eight to fourteen years of age during the whole school term, and up to sixteen years of age unless eight grades have been completed. Pupils in towns not having high schools are permitted to attend approved schools in other towns, the expense thereof being met by the home district.

New Hampshire organized its school system before the law was passed providing school funds from the sale of public lands, and therefore most of the money for the support of its schools is raised by local taxation. State normal schools are located at Plymouth and Keene, the University of New Hampshire is at Durham. Dartmouth College at Hanover is the most important educational institution, and one of the leading colleges of the country (see DARTMOUTH COLLEGE). Saint Anselm's College at Manchester is the leading Roman Catholic school. Phillips Exeter Academy at Exeter and Saint Paul's School at Concord are well-known schools for boys

Institutions. The charitable and corrective institutions include a school for the feeble-minded at Laconia, a soldiers' home at Tilton, an industrial school at Manchester,

a sanitarium at Glencliff, and the state prison and the hospital for the insane at Concord.

History. New Hampshire was first settled about 1623 by fishermen from Massachusetts, in the neighborhood of Dover and Portsmouth. It was granted to George Mason, but his claims were afterwards silenced, and the colony voluntarily united with Massachusetts and remained so with slight interruptions until 1741. New Hampshire took a leading part in the pre-Revolutionary discussion and furnished more than its quota of soldiers to the continental armies. It was among the first states to adopt an independent constitution, and its ratification of the Federal Constitution, June 21, 1788, assured the final adoption of that instrument. In 1784 the first constitution was revised; eight years later it was rewritten, a new one, the present constitution, was adopted in 1877, and this has been amended many times, in the direction of political and social reforms. An old-age pension system was adopted in 1931, benefits average \$20 per month (maximum, \$750 per week).

Related Articles. Consult the following titles for additional information:

Berlin	Keene	Nashua
Concord	Laconia	Portsmouth
Connecticut	Manchester	Saco River
River	Merrimac	White
Dover	River	Mountains

NEW HAVEN, CONN., one of the oldest towns in the Union, and one of its great educational centers, the second largest city in the state and the county seat of New Haven County. It is situated 72 miles east and a little north of New York City, on New Haven Bay, four miles from Long Island Sound and on the New York, New Haven & Hartford Railroad which provides the services of its six divisions. The Connecticut Company links it by interurban service with the entire state. There is a municipal airport. Two lines of steamships convey passengers and freight to leading points on Long Island Sound and also to New York City.

Distinctive Features. The site of the city is a low plain between two elevations of 360 and 400 feet respectively at the east and west; also two rivers, the Quinnipiac and the West are on the east and west sides of the city. A great many old elms have given the name "City of Elms" to New Haven, but these earlier landmarks have largely disappeared. More than 2,000 acres are given to parks. The most famous park in the city is "The Green," a square of 16 acres at the center of

the city, adjoining the main buildings of Yale University. In it stands a church designed by Sir Christopher Wren. West Rock Park (281 acres) contains the "Judges Cave," where it is claimed that Goffe, a signer of the death warrant of Charles I, and his father-in-law, Whalley, concealed themselves in 1661, when sought by Charles II for punishment.

Yale University (which see) and five colleges give the city great fame. There are 56 public, nine parochial and many private schools for girls and boys. Some of the university buildings are emphatic ornaments to the city. Other prominent institutions and buildings are the Federal building, the court house of white marble, the public library, Harkness Memorial Tower, the New Haven Colony Historical Society, the Morris House. The Yale Bowl seats 78,000.

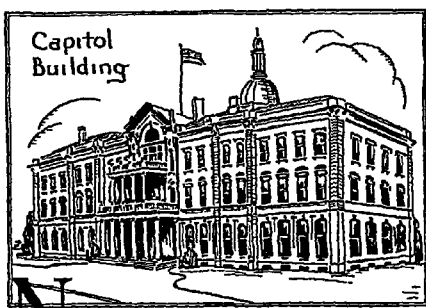
Industries. Ship building is no longer thriving, but there are 432 factories and 357 wholesale houses. Goods manufactured include ammunition and arms, hardware, clocks and watches, rubber goods, corsets and clothing, machinery, wire and wire goods, paper boxes, toys, boilers, cigars and many other articles. New Haven is the third largest jobbing and wholesale center in New England, dealing in building materials, farm produce, machinery, oil, coal, drugs and many other articles.

Early History. In 1638 a company of Puritans, under Theophilus Eaton and the Reverend John Davenport, settled at the place, called by the Indians Quinnipiac. Two years later the town was given the name of New Haven, and it became the capital of the independent "New Haven Colony." In 1665 this was united with the Connecticut colony, of which in 1701 it was made a joint capital with Hartford, retaining this position until 1873. A force of British took the town on July 5, 1779. In 1784 New Haven was incorporated as a city.

The city is under the council form of government. Population, 1930, 162,655.

NEW HEBRIDES, *heb'ri deez*, a group of islands in the Pacific Ocean, lying northeast of New Caledonia and northwest of the Fiji Islands. Some are of coral formation, others are of volcanic origin. Their total area is about 5,100 square miles. They are fertile, and produce coconuts, breadfruits, bananas, pineapples, oranges and sandalwood. The climate is unhealthy, even for the natives. The inhabitants, which number about 50,000,

are Melanesians, formerly cannibals, but civilized by European influence. The islands are jointly administered by England and France.



NEW JERSEY, one of the original thirteen states of the American Union, the third (after Delaware and Pennsylvania) to ratify the Constitution. This occurred December 18, 1787. It is one of the Middle Atlantic states. New York is on the north and northeast, the Atlantic Ocean is on the east, and the Delaware Bay and Delaware River separates the state from Delaware and Pennsylvania on the south and west. The area is 8,224 square miles, which makes it the forty-fifth in size, only Connecticut, Delaware and Rhode Island being smaller. However, it was ninth in population in 1930, with 4,041,334 people, an increase of over 885,000 since 1920. The legislature, by resolution in 1913 made the violet the emblematic flower of the state.

Surface and Drainage New Jersey is divided into four physiographic regions, three of which extend across the state in a northeast-southwest direction. The first of these regions is bounded on the west by the Kittatinny Mountains, a continuation of the Blue Mountains in Pennsylvania. The cut through these mountains made by the Delaware River forms the famous Delaware Water Gap, noted for the beauty of its scenery. The mountains of this range do not exceed 1,800 feet in altitude. To the east of these mountains lies the Kittatinny valley, an extension of the great Appalachian valley, and containing many fertile and highly-cultivated farms.

The second region, known as the Highland Belt, is a succession of plateaulike masses, having altitudes of 1,200 to 1,400 feet. To the east of this is the Piedmont plain, nearly

as wide as the other two regions combined, having a variety of surface and containing a number of bold ridges, the most famous of which is the Palisades. The plain descends by gentle undulations to sea level at Newark Bay.

The fourth region includes all that part of the state lying south of a line running from Newark Bay to Trenton. This is a section of the Atlantic coastal plain, nowhere more than 400 feet in altitude and sloping gently to sea level.

The western part of the state is drained by the Delaware River, into which flow numerous short tributaries. The rivers flowing into the Atlantic, in the southern part, are characterized by broad estuaries. To the north, the Raritan flows into Raritan Bay, and in the northeastern section are the Passaic and the Hackensack, flowing into Newark Bay.

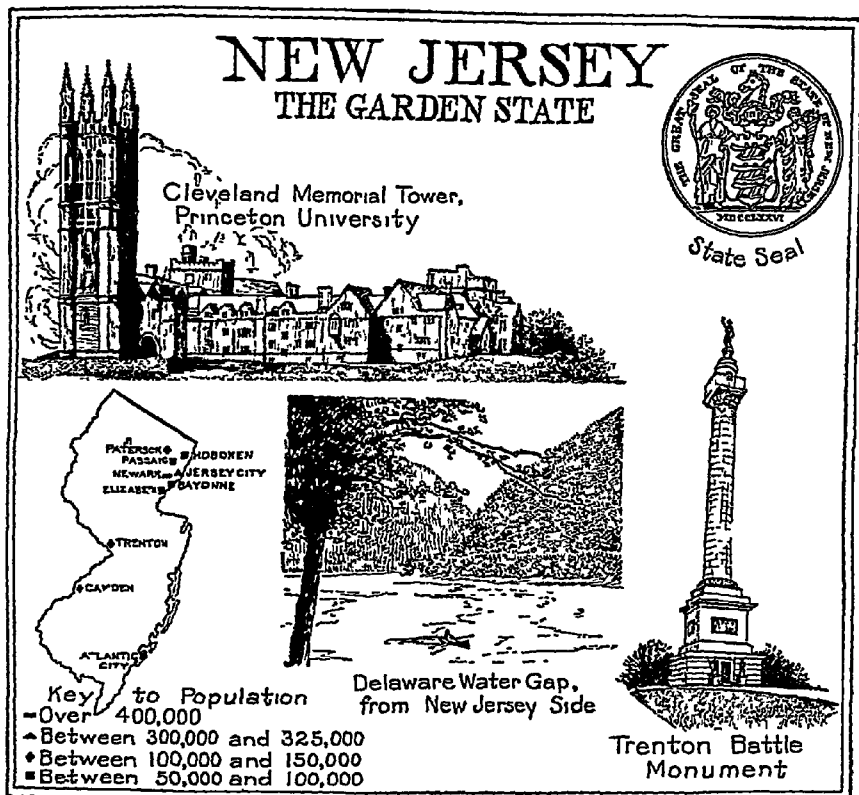
Climate New Jersey has a mild, temperate climate, with considerable variations from north to south. These differences in climate conditions make a considerable difference in the production of crops. The mean annual temperature at Atlantic City is about 52°, and the annual rainfall is about fifty inches.

Mineral Resources. As a mineral producer, New Jersey depends largely on the utilization of its clay resources. Clay products represent about half of the state's total mineral output and include every variety of brick and tile and of pottery produced in the United States. Mercer County, which includes Trenton, is the center of a great pottery industry.

Middlesex County is the principal center for the production of common brick, architectural terra cotta, and tile.

Large quantities of zinc ore are also found, in the production of zinc. New Jersey is second only to Missouri. Among other minerals of importance are limestone, sand, gravel and trap rock, used largely for road making and concrete, and rock suitable for the manufacture of Portland cement. There are extensive beds of iron ore in the Highland Belt, actively mined in the early years of the state's development, but now of relatively small importance.

Fisheries New Jersey, with its extensive coast line, and with its proximity to large city markets, has developed a large fishing industry. Shad, clams, bluefish, cod and lob-



sters are taken in large quantities. Many are engaged in the oyster industry, which yields annually an income of about \$5,000,000.

Agriculture. About one-half of the land area of New Jersey is in farms, of which two-thirds is improved. The soil is generally fertile and easily tilled. There is an abundance of moisture, and the climate is suitable to the production of fruits, vegetables and cereals. Because of the nearness to great urban centers, all localities have the advantage of good markets for these products. Hay and grain are grown in considerable quantities, but mainly as auxiliary to the important dairy and poultry industries. New Jersey dairymen have pioneered in the breeding of purebred cattle, and in the production of high grade milk for city markets. The state also ranks among the first in communal poultry farms, and was

the birthplace of the baby chick industry. Irish potatoes, sweet potatoes, tomatoes and other truck crops are raised on a large scale. There are extensive orchards of apples and peaches in some regions, and large quantities of small fruits are grown in the southern counties. Cranberries in large quantities are grown on the lowlands of the coastal plain area.

Manufactures. Considering its size, New Jersey is one of the leading manufacturing states, most of its major industries are located in the northern section. One of its leading industries is the refining of petroleum, centering in the great refineries at Bayonne. Others of great importance are the manufactures of silk, cotton and woolen textiles, linoleum, jewelry, electrical instruments and machinery, chemicals, soaps and dentifrices. Pottery and sanitary ware, terra cotta and tile, are among the leading industries.

Transportation and Commerce. New Jersey is well supplied with railroads, since several trunk lines running to New York pass through the state. The total railroad mileage is 2,300. The Delaware River is navigable for ocean steamers. Trenton has a port for ocean freighters. Raritan Bay also affords deep water transportation. The state's highways are highly developed, and the airport at Newark is an important station in the nation's air transport service. Direct communication with New York City is afforded by the George Washington bridge over the Hudson River, and by railway and vehicular tunnels under it.

Education. The interests of education have not been neglected since the first New Jersey school was founded at Bergen in 1661. The first general school law was enacted in 1693. The College of New Jersey, now Princeton University, was founded in 1746, and Queen's College, now Rutgers University, in 1766. The state school law of 1871 made schooling free to all children. The administration of primary and secondary education is entrusted to a state board of education of eight members.

The interests of the state in higher education are entrusted to a board of regents. Princeton ranks as one of America's great universities. Rutgers University at New Brunswick embracing the State College of Agriculture and the New Jersey College for Women, by contractual agreement with the state, fulfils certain requirements, state and national, in lieu of a state university. Among other schools of high rank are the following:

Stevens Institute of Technology, Hoboken
Drew University, Madison
Newark College of Engineering, Newark
College of Saint Elizabeth, Convent
Seton Hall College, South Orange
Saint Peter's College, Jersey City
Upsala College, East Orange

There are teachers' colleges at Montclair and Trenton, and normal schools at Newark, Glassboro, Jersey City and Paterson.

Institutions. The following are the principal public institutions: state hospitals at Trenton, Greystone Park, and Holmdel, the Sanatorium for Tuberculous Diseases at Glen Gardner, the State Village for Epileptics at Skillman, state colonies for feeble-minded males at New Lisbon and Woodbine, the Vineland State School at Vineland, the North Jersey Training School at Totowa, the New Jersey Home for Disabled Soldiers

at Menlo Park; the New Jersey Memorial Home for Disabled Soldiers, Sailors, Marines and Their Wives and Widows at Vineland, the State Prison at Trenton, the New Jersey Reformatory for Women at Clinton; the State Home for Boys at Jamesburg, and the State Home for Girls at Trenton.

Cities. In 1930 there were sixty-six cities each having a population exceeding 10,000. Newark is the largest, the next five, in order of size, are Jersey City, Paterson,

Items of Interest on New Jersey

Except the short boundary line at the north which divides New Jersey from New York, the state is bounded on all sides by water.

The highest point in the state is in the extreme northwest corner and is known as "High Knob"; it has an altitude of 1,799 feet.

New Jersey ranks among the first silk manufacturing states. Paterson is the leading city in the United States in the production of silk goods.

The petroleum refineries at Bayonne are among the largest in the United States.

The first railroad in New Jersey was the Camden and Amboy, opened in 1831.

A circle drawn with the City Hall, New York, as its center, and having a radius of twenty-five miles, will include what we may term the New York metropolitan area, nearly three-fifths of the population of New Jersey live in that area.

Questions on New Jersey

Describe the geographical position of New Jersey.

What can you say of the surface of New Jersey?

Why is market gardening so profitable?

Name the three leading agricultural products.

What features gave New Jersey exceptional fishing facilities?

Describe the mineral resources of the state.

What is the most important industry of the state?

For what is Trenton noted?

Trenton and Camden. (See alphabetical list at the end of this article.)

Government. The legislature is composed of one senator from each county, elected for three years, and an assembly of not more than sixty members, apportioned among the counties according to population, and elected for one year. The legislature meets annually. The executive power is vested in a governor, elected for three years. The chief state officers are a treasurer and a comptroller, elected for three years by the senate and assembly in joint session. A secretary of state, an attorney-general, an adjutant general, a commissioner of banking and insurance, a clerk in chancery, a clerk of the supreme court and a superintendent of public instruction are appointed by the governor, with the approval of the senate.

History. The first settlement in New Jersey was made by the Dutch, about 1617. Thereafter it was settled successively by the Swedes and the English, who with the Dutch, maintained a continuous warfare for the control of the territory until 1664, when the English gained control. It was granted by Charles II to the Duke of York and by him to lords Berkeley and Carteret. By them it was divided into two territories, East and West Jersey, and in 1682 an organization, chiefly of Quakers under William Penn, bought East New Jersey, but later relinquished their rights, and the two territories were reunited in 1702. During the French and Indian Wars, New Jersey loyally supported the English cause, but in the Revolution it contributed, besides its militia, more than 10,000 men to the Continental army. It was the scene of some of the most important campaigns of that war, and suffered heavily.

In the Constitutional Convention, the delegates from New Jersey steadily opposed the establishment of a strong central government, the so-called *New Jersey plan* contemplating a union that was to have little authority over the states. In the slavery struggle the state was generally hostile to the institution and furnished its full quota of men to the Union armies. The chief issues in the state politics after the war have been those connected with the taxation and control of corporations. The state has furnished one President—Woodrow Wilson.

Related Articles. Consult the following titles for additional information:

CITIES
Atlantic City Bayonne Bloomfield

Camden	Millville	Passaic
Elizabeth	Morristown	Paterson
Hoboken	Newark	Perth Amboy
Jersey City	New Brunswick	Trenton
Long Branch	Orange	

GENERAL

Delaware Water Gap	Princeton University
Honmouth, Battle of	Princeton, Battle of
Fallsides	Trenton, Battle of

NEW LONDON, CONN., one of the county seats of New London County (Norwich being the other), fifty miles east of New Haven, on the New York, New Haven & Hartford and the Central Vermont railroads, and on the Thames River, about three miles above Long Island Sound. It is a beautiful residence place and a popular summer resort. There are regular steamboats to New York, and the city has a good harbor, with Fort Griswold at the entrance. This fort was built during the Revolutionary War, and is obsolete. The place was once famous as a whaling port. The various industrial establishments include machine shops, foundries, printing-press works, silk mills, shipyards and furniture. The city has several parks, two hospitals, a handsome public library, the library of the county historical society, the Connecticut College for Women and a United States Coast Guard Academy.

The place was settled in 1646 by John Winthrop, and was known as Naumeg until 1653. In 1781 Benedict Arnold with a large British force, assisted by a fleet, attacked the city, killed a number of the inhabitants and burned most of the wharves and stores. A shaft 127 feet high has been erected as a memorial to the victims. Other places of historical interest are the Hempstead House, one of the oldest in the state, the old town mill, erected in 1646 and still in operation, and the little school in which Nathan Hale was teacher. Population, 1920, 25,633, in 1930, 29,640.

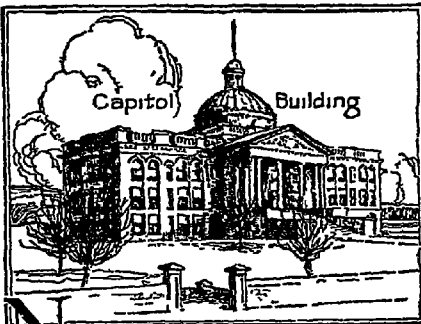
NEWMAN, JOHN HENRY, Cardinal (1801–1890), a distinguished Roman Catholic divine. He was born in London, the eldest of six children and was educated at Trinity College, Oxford. In 1824 he was ordained in the Church of England. He was vice-president of Saint Alban's Hall (1825–1826) under Doctor (afterward Archbishop) Whately, and later became tutor in Oriel College. In 1828 he became vicar of Saint Mary's, the university church, where his powerful sermons gained for him a commanding position. He took part with Keble and Pusey in originating the Oxford move-

ment, was a leader in the propaganda of High Church doctrines and contributed largely to the celebrated *Tracts for the Times*. The last of these, on the elasticity of the Thirty-nine Articles, was censured by the university authorities and was the cause of Newman's resignation of his offices in 1843.

In 1845 he joined the Church of Rome. Newman was ordained a priest of that Church and became head of the oratory of Saint Philip Neri at Birmingham, rector of the Roman Catholic University of Dublin (1854-1858) and principal of the Roman Catholic school at Edgbaston. In 1879 he was created a cardinal. He wrote some remarkable works sustaining the doctrines of the Church of Rome, particularly the *Apologia pro Vita sua* (1864) and the reply to Mr Gladstone (1875) on the *Vatican Decrees*. He is the author of the well-known hymn, popular in all denominations, *Lead, Kindly Light*.



CARDINAL
NEWMAN



NEW MEXICO, one of the Southwestern states of the American Union, the fourth in size and the forty-third in population. New Mexico was next to the last territory to attain statehood, being formally admitted to the sisterhood of states just ahead of Arizona. Industrially the state is noted for its great mineral production. The popular name of New Mexico is SUNSHINE STATE, the state flower is the yucca.

Location and Area. Four American states and one foreign country touch the borders of

New Mexico. Its entire northern boundary adjoins the frontier of Colorado, and the western state line coincides with the eastern Arizona boundary. Mexico and Texas are on the south, and Texas also follows the eastern boundary with the exception of about thirty-five miles in the extreme north, where the "Panhandle" of Oklahoma projects westward. The state has three straight boundaries meeting so as to form regular angles, but the southern boundary line is broken in two places. New Mexico has an area of 122,634 square miles, of which 131 square miles are water surface. It is exceeded in size by Texas, California and Montana; its area is nearly twice that of all the New England states combined.

People and Cities. In 1920 the population of New Mexico was 360,350, in 1930 it had grown to 423,317, there were 35 persons to each square mile. This great state could contain ninety-eight Rhode Islands, but the ratio of the number of inhabitants per square mile to the number for Rhode Island is about 1 to 184.

There are no large cities, Albuquerque, with a population of 26,570, is the only municipality with over 12,000 inhabitants. Santa Fé, the capital, Las Vegas, a prominent wool market, and Roswell, are the most important of the other cities.

Besides the English-speaking people, there are in New Mexico a large number of Spanish-Americans, Indians and mixed breeds, called *Mestizos*. There are about 29,000 Indians, of Navaho, Pueblo and Apache stock. Many of these are progressive and industrious, and the terraced villages of the Pueblos are among the most interesting Indian antiquities in North America. The Spanish-Americans, who are slow to adopt modern ways of living, were about 60,000 in number in 1930. About three-fifths of the people in New Mexico are Roman Catholics, Methodists, Presbyterians and Baptists are the largest Protestant denominations.

Surface and Drainage. The state occupies an elevated plateau having its greatest altitude in the west and northwest, and sloping gradually towards the south and southeast. In the Pecos valley near the southern boundary is a small area less than 3,000 feet in altitude, but with this exception the plateau is above 3,000 feet. This plateau is divided into distinctly-marked surface areas, which extend across the state from

north to south. Beginning on the east, the first of these is a region belonging to the Great Central Plain. In the southeastern part this region slopes to the level and arid plateau known as the Llano Estacado, or Staked Plain. West of this region is the Pecos valley, which is the lowest land in New Mexico. From this valley the surface rises westward until it meets the Front Range of the Rocky Mountains.

West of this range is the valley of the Rio Grande, which traverses the state from north to south, and west of this is the great broad plateau which forms the Continental Divide. In the central part are a number of plains covered with grass, lying between isolated groups and mesas of the Front Range. Towards the south these plains are succeeded by barren valleys containing lava beds and salt marshes. There are several lofty peaks, the most prominent being Cerro Blanco, 14,269 feet, Truchas, 13,275 feet, Taos, Costilla, Baldy, Lake and Mora, all over 12,000 feet in altitude.

New Mexico, for a region with a small amount of rainfall, has a large number of rivers. Many of them disappear in the dry season, and none is navigable. The Rio Grande passes completely through the center of the state from north to south and receives many tributaries. The northeastern section is drained by the Red River and its numerous branches. The Pecos rises northeast of Santa Fé and flows south across the Texas line, finally joining the Rio Grande. In the northwest is the Rio San Juan. In the central west are the headwaters of the Little Colorado, and in the southwest are those of the Gila.

Climate. The delightful and healthful air of New Mexico has given it a reputation as a health resort, especially for consumptive patients. The mean temperature at Santa Fé is 48°, the extremes being from 1° below zero to 70° above zero. The yearly rainfall varies from six inches in the southwest to thirty inches in the mountains in the north.

Agriculture. The greater portion of the state is pasture land, and stock raising, next to mining, is the chief industry. Wherever there is sufficient water, either in streams or in springs, to supply the wants of animals, the grass is amply sufficient to support either cattle or sheep. New Mexico, with about 2,800,000 sheep, is prominent in the sheep-raising industry, ranking sixth among the

states. The supply of timber is small, only the higher sections being timbered, and even there not densely. Pine in the mountains, scrub oak and juniper in the lower sections, willow and cottonwood along the river banks are common.

The farm area is about one-seventh of the total land area, and two-fifths of the farms are irrigated. The most profitable crop is hay, corn, wheat, potatoes and oats are next in order among grains and vegetables. Potatoes succeed best in the mountainous regions. The Taos valley is an exceptionally fine wheat country. It is as a fruit-producing region, however, that a large portion of the irrigated land of the state especially excels. The area of fruit and vine culture is being yearly extended. Peaches, plums and apricots come to perfection in the north, and pears, apples, quinces, cherries and other fruits flourish throughout the middle and southern sections. Grapes are abundant from Bernalillo to El Paso, and in some favored spots, like La Joya, farther north.

Mineral Resources. Mining operations have been carried on since the discovery of this region by the Spaniards. Nearly all of the mountainous portions of the state are rich in minerals. Those mined to the greatest extent are copper, coal, gold and silver. The output of copper has greatly increased, and now will average 27,000,000 pounds a year. Anthracite, bituminous coal and lignite are found, and the yearly output is over 1,000,000 tons. The mining of gold ranks next in value, and this is followed by silver. Emeralds, turquoises and other precious stones are found in paying quantities, the output of petroleum is close to 17,000,000 barrels a year.

Manufactures. The manufactures are limited in extent, but in late years they have rapidly increased in number and importance. Most of the industries are connected with the smelting and refining of ore and the construction and repairing of cars and locomotives for the railway lines passing through the state. There are a number of flour mills, some sawmills and numerous carpentry and repair shops in various localities to meet the demands of the surrounding population. The large production of wool (17,000,000 pounds) has led to the establishing of several plants for wool-scouring. There are also a number of beet-sugar factories and establishments for canning fruit.



Transportation. The Atchison, Topeka & Santa Fé Railway system enters the state in the northeastern section and extends across it from north to south, following, through a large part of the way, the valley of the Rio Grande River. The western branch of this line extends westward to the Pacific coast and east to Texas and the Gulf of Mexico. A branch of the Southern Pacific enters New Mexico from the east and traverses it in a southwesterly direction to El Paso, thence westward into Arizona and then to the Pacific coast. The other important lines are the El Paso & Southwestern, the Rock Island and the Denver & Rio Grande. The total railway mileage is about 2,285.

Education. The large number of Spanish-speaking residents gave New Mexico a high rate of illiteracy in the past, but this rate is rapidly being lowered as the public school system is becoming steadily more efficient. All children between the ages of six and sixteen are compelled to attend school, and the use of the English language is compulsory.

Besides the white schools, with their enrollment of over 153,000 pupils, there are twenty-six Indian schools maintained by the United States government. There is a state director who oversees industrial education, but other public schools are under the supervision of a state superintendent and local boards of education. For higher instruction there are normal colleges at Las Vegas and Silver City, the University of New Mexico at Albuquerque, a school of mines at Socorro, a military institute at Roswell, and a college of agriculture and mechanical arts at State College.

Institutions. The state corrective and charitable institutions include a hospital for the insane at Las Vegas, a miners' hospital at Raton, a reform school at Springer, an asylum for the blind at Alamogordo, and the state penitentiary at Santa Fé.

Government. New Mexico is governed under its first constitution, adopted in 1911. All amendments to this document must be ratified by popular vote. The legislative de-

Item of Interest on New Mexico

The Carlsbad Caverns are noted for their size and magnificence

The railway mileage is about 2,285, the length of railway per inhabitant is five times the average for the United States, but the length per square mile is only one-third of the average

The Rio Grande is sometimes called the "Nile of New Mexico," because it overflows its banks during the flood season

Throughout the year there are about 214 days which are neither cloudy nor rainy There are usually two snows a year in the valleys, but the snow melts quickly.

The state's undeveloped coal mines contain 192 billion tons, according to the Geological Survey

Religious instruction in the public schools is forbidden by law, but religious societies may hold meetings in the schools outside of school hours, under the authority of local boards

New Mexicans of Spanish descent cling to their old customs, and most of them live in small adobe houses

Questions on New Mexico

How does New Mexico rank in size among the states?

In what part of the state is the Continental Divide?

Where are the Staked Plains?

Name three important rivers What parts do they drain?

Characterize the four zones of vegetation

What per cent of the area is included in farms?

Name four important crops

What is the most important industry?

What is the value of the annual output of coal? What other minerals are important?

What is the total railway mileage?

What are the chief classes of inhabitants?

What are the leading educational institutions?

What episode on New Mexican soil caused strained relations between the United States and Mexico?

partment consists of a senate of twenty-four members and a house of representatives of forty-nine members, the former serving four years and the latter two The executive department comprises the governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general, superintendent of public instruction and commissioner of public lands A supreme court, district courts, county probate courts, justices of the peace and other inferior courts established by law constitute the state judiciary

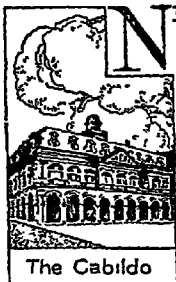
History. The region of New Mexico attracted Spanish explorers in the sixteenth century, and notwithstanding the brave resistance of the Pueblo and Navaho tribes, white settlement gradually made its way Santa Fé, the present capital, was founded between 1605 and 1616 When Mexico gained its independence from Spain, in 1821, the territory now occupied by the state of New Mexico became a Mexican province, and within the next few years prosperous trade relations were established between the province and the frontier American settlements During the Mexican War Santa Fé was occupied by United States troops under Colonel Kearny, and by the Treaty of Guadalupe Hidalgo (1848) the territory of New Mexico became a part of the United States The act of organization became effective in March, 1851 At that time the area of New Mexico was considerably greater than now, and it was increased later by the Gadsden Purchase With the organization of Colorado and Arizona as territories, the present limits were defined

In 1906 Congress attempted to provide for the admission of Arizona and New Mexico as one state, but the dissent of the Arizona voters checked this plan, and neither became a state for several years New Mexico adopted a constitution in 1911, and President Taft issued the formal proclamation of statehood, effective January 6, 1912 The border disturbances of 1915 and 1916 caused great anxiety in New Mexico, and the raid on the town of Columbus by the Villa forces was the immediate cause of an American expedition into Mexico

Related Articles Consult the following titles for additional information

Albuquerque	Las Vegas	Raton
Apache	Mexican War	Rio Grande
Cliff Dwellers	Mexico History	Rocky
Gadsden	Navaho	Mountains
Purchase	Pueblo	Roswell
Gila		Santa Fe

NEW MEXICO, UNIVERSITY OF, a coeducational university, located at Albuquerque It was established by act of the territorial legislature in 1889, and was opened in 1892 Since 1911, when New Mexico was admitted as a state, it has been the state university To the original teachers' and preparatory departments there have been added a commercial school, a college of letters and arts, a college of science and engineering, a summer school and schools of art and music The Hadley Climatological Laboratory, established to study the effects upon disease of dry climates and high altitudes, is maintained in connection with the university The faculty numbers about seventy-seven, and the student enrollment is over 1,800



NEW ORLEANS, *a w r'le*
anz, La., founded by the French, ceded to Spain and again turned back to France, and in 1803 a part of the Louisiana Purchase by the United States, is one of America's most interesting cities Excepting Los Angeles, it is the largest city in the country south of the latitude of Saint

Louis and San Francisco New Orleans is the one large city of Louisiana and, next to Natchitoches, is the oldest settlement in the state It is 912 miles south of Chicago and 639 miles in a direct line down the Mississippi River from Saint Louis From its location on that river to its mouth in the Gulf of Mexico is 110 miles, although arms of the Gulf extend to within less than twenty miles of the city at the east Population, 1920, 387,219, in 1930, 458,762, a gain of 18.5 per cent

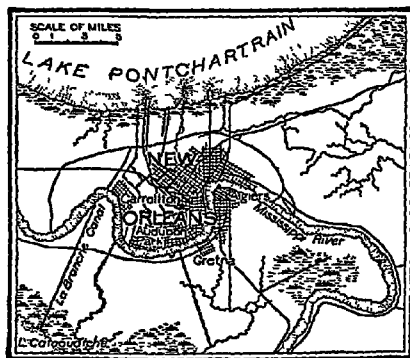
New Orleans is called the **CRESCENT CITY**, because in early days the town stretched along a crescent-shaped bend in the river To-day it has reached such a growth in each direction that the form is more like that of the letter S The corporate limits embrace the entire parish (county) of Orleans (nearly 200 square miles), but the city proper is built upon only about forty square miles This area includes the town of Algiers, across the river, connected with the main city by ferries which run at ten-minute intervals

The **Old French City** There are two distinct parts of the city—the modern American section and old French quarter The latter

remains much as it was a hundred years ago In that section is the old historic **Cabildo**, built by the Spanish government in 1795 In this building Spain ceded Louisiana to France, and here France transferred it to the United States The **Cabildo** and the adjoining **Presbytery** (built in 1812) are now historical museums In the French section was formerly the famous **French Opera House**, where for many years operatic companies from France sang every winter The French opera at New Orleans was famous throughout the country The oldest building is the **Ursuline Convent**, built in 1730

In the French quarter the French language is yet spoken by many people, for here live the old Creole families, the French government provides money for schools for children of French parentage The streets are narrow—this is true also of many streets in the newer parts of town, where traffic can go in but one direction, the buildings are picturesque and in sharp contrast to the business and residential sections of the purely American part of the town

The **Newer City**. Modern New Orleans is a city of great banks, tall commercial buildings, parks, metropolitan newspapers and



LOCATION OF THE CITY

palatial hotels Canal Street, the principal thoroughfare, is 170 feet wide, it runs from the river through nearly the entire length of the city, and divides the French quarter from the modern town At right angles to Canal Street is Saint Charles Street, they intersect in the heart of the business section On Saint Charles are many of the finest residences

Buildings and Institutions Historical interests compete with all others at New

Orleans Of special importance are the Confederate Museum, the Delgado Art Museum and the museums at Tulane University There are 14 hospitals and 502 churches Parks cover 1,376 acres, 16 playgrounds with six swimming pools cover 40 acres New Orleans finances the world's greatest pageant each year, called the Mardi Gras, at a cost of about \$200, 000 It occurs in February or March, not one was missed for two generations until 1918 and 1919, when it was not held because of war conditions (see MARDI GRAS) Along the shores of Lake Pontchartrain, within the city limits, are numerous amusement resorts

Education The Orleans Parish School Board administers more than 100 elementary and high schools and special institutions, among these are Delgado Trade School for boys with an endowment of more than \$1, 000,000 and the Nicholls Industrial School for girls and the New Orleans Normal School. The Catholic parochial schools are about as numerous as are the public schools Institutions of higher education include the famous Tulane University (which see) to which is attached the H Sophie Newcomb Memorial College for Women, Loyola University of New Orleans, Dillard Memorial University, the state university College of Medicine, the Ursuline Convent, and for Negroes, New Orleans University, Straight College and Xavier University There are numerous private finishing schools, business and special schools The libraries of the universities and college, the Carnegie Library, the Howard Memorial Library, the Parish Medical Society Library, the state library and other semipublic libraries afford rich resources for study

Transportation and Industry. The city is a great ocean port, its commercial importance is enhanced by the traffic on the Mississippi and by the services of the following railroads Gulf, Mobile & Northern, Illinois Central, Louisiana & Arkansas, Louisville & Nashville, Missouri Pacific, Southern Pacific, Southern Railway, Texas & Pacific and certain smaller lines The Port of New Orleans and the entire waterfront extend beyond the limits of the parish of Orleans, they are owned and administered by the Board of Port Commissioners, an agency of the state appointed by the governor Fifteen bus lines reach the city; there are four airports and landing fields New Orleans is the metropolis of the South

The principal industries are sugar refining, textile bags, cotton seed products, alcohol, wearing apparel, wall board, petroleum refining, cotton mill products, printing and publishing, coffee roasting and grinding, syrup and molasses, bakery products, tobacco products, lumber products, flavoring extracts, rice polishing, roofing, fertilizer and twine The total annual output of manufactures is worth \$200,000,000 Annual earnings of the port of New Orleans give it fourth place, following New York, Philadelphia and Boston, for many years it stood in third place It is one of the great cotton markets of the world

History On April 9, 1682, Robert Caveher de la Salle reached the Gulf of Mexico by way of the Mississippi River In 1699 a Canadian, Iberville, and his brother Bienville discovered the "hidden river" afterwards named "Baton Rouge," also lakes Maurepas, Pontchartrain and Bay St Louis The city was laid out by Jean Baptiste La Moyné in 1718 and was named for the Duke of Orleans, who was at that time regent of France In 1723 it became the capital of the French territory on the Lower Mississippi In 1762 it was ceded to Spain, together with other French territory, but the inhabitants objected, and when the Spanish governor arrived four years later he was expelled This gave rise to considerable trouble, during which the leaders in the revolt were severely punished In 1800, by the Treaty of Ildefonso, the territory was ceded to France, and in 1803 it became a part of the United States, under the Louisiana Purchase Near the city the last battle of the War of 1812 was fought The development of the cotton industry gave the city considerable impetus, and it grew to a population of over 100,000 before the Civil War At the outbreak of that conflict New Orleans was an important military center for the Confederates, until it was captured in 1862 by the Federal forces, under Farragut and Butler, after which it was used as a base of supplies and a point from which to sent military expeditions into the surrounding Confederate territory During the reconstruction period the city suffered from misgovernment, but with the withdrawal of Federal troops and the reestablishment of home rule, the city struggled toward a return of prosperity

Until 1880 the capital of the state was here, in that year it was moved to Baton Rouge In 1884, one hundred years after the

first bale of cotton was shipped from the United States to Europe (it was sent from Charleston, S C), a cotton Centennial Exposition was held in New Orleans. The city is governed by a Commission Council and a mayor. The five departments are public affairs, safety, finance, utilities, and property.

NEW ORLEANS, BATTLE OF, the last battle of the War of 1812, fought January 8, 1815, at Chalmette, near New Orleans. The American force defending New Orleans, commanded by General Andrew Jackson, was made up of Kentucky and Tennessee backwoodsmen and other volunteers. The

bus lines connect the three cities. Newport is a popular residence district for Cincinnati business men. Important buildings and institutions are the Carnegie library, the city hall—courthouse, and the Finance Building. Industries include iron and steel-making, metal fabrication, manufacture of wire screens, toys, metal signs and road markers, poultry and stock identification bands, and beauty-parlor equipment. The 35 building and loans associations have an investment of \$35,000,000. The town was settled in 1791 and was chartered as a city in 1850. Population, 1930, 29,744.

NEWPORT, R I, one of the oldest towns in America, the county seat of Newport County, 30 miles south of Providence, on the island of Rhode in Narragansett Bay, and on the New York, New Haven & Hartford Railroad. The city has an airport. There are two obsolete forts, Adams and Grebel, at the entrance of the beautiful harbor. Regular steamship service connects the city with New York, Providence and other cities. The beautiful scenery, equable climate and excellent facilities for bathing, boating and motoring have made the place a very fashionable and exclusive summer resort. The old town is attractive because of its narrow streets and quaint houses near the harbor, while the modern section reaches over to the ocean side of the island and contains many very costly summer residences. The important buildings are the city hall, the old state house, the armory, the Casino building, the courthouse, the Federal building, the Jewish community center, the Seamen's Church Institute, Redwood Library and Athenæum, Trinity Church, Rochambeau House, Old Stone Mill, Newport Historical Society, and the Wanton-Lyman-Hazard House. Three libraries provide 128,000 volumes; there are two museums and 26 churches.

Manufactures are of small concern commercially. They include chewing gum, sausage, precision instruments, cartoning machinery, the Government manufactures torpedoes.

Refugees from the Massachusetts Bay colony settled at Newport in 1639. The Baptist church organized in 1640 is the second oldest in the United States. Several colonies united in 1644 under a charter secured by Roger Williams. The trade in sugar and molasses brought from the Barbadoes, and in rum manufactured at Newport involved the mer-



LOCATION OF BATTLE FIELD

British force of 7,000 men, commanded by Sir Edward Pakenham, had just landed, direct from England, on the Louisiana coast. The Americans fought behind earth breastworks, and in half an hour after the engagement started completely overpowered their adversaries, who lost 2,500 men, including their leader. Eight Americans were killed and thirteen were wounded. The battle was fought after the signing of the treaty of peace, but neither commander had knowledge of this event. The victory made General Jackson the idol of the people and was one important cause of his election to the presidency. See WAR OF 1812.

NEWPORT, KY, in Campbell County, on the Ohio River, opposite Cincinnati, Ohio, the Licking River separates it from Covington, Ky. It is on the Chesapeake & Ohio and the Louisville & Nashville railroads. Bridges and

chants in the African slave trade. During the Revolution the British entirely destroyed the town, it never regained its commercial leadership. Population, 1930, 27,612.

NEWPORT NEWS, Va., in Warwick County, 12 miles northeast of Norfolk on Hampton Roads, at the mouth of the James River, and on the line of the Chesapeake & Ohio Railroad. It has interurban lines and a landing field. This is the "Shipbuilding City," with huge dry docks and a large force of workmen. As a center of shipbuilding, a terminal for a large railroad system and a link in the group of adjacent cities, all with large ocean trade, Newport News holds a strategic position in commerce. Important institutions are the Huntington Mariners' Museum, the library, the Federal building, the Masonic Temple and the courthouse.

In 1880 Collis P. Huntington converted a fishing village into a metropolis by choosing it as a deep water terminal for a railroad. In 1889 he established the shipbuilding and repair plant. Population, 1930, 34,417.

NEW RED SANDSTONE, the name of a group of rocks lying between the Carboniferous and the Middle Triassic systems. The formations are loams, shales and sandstones, all of which are usually of a reddish color. The name was given this group to distinguish it from the Old Red Sandstone group which lies below the carboniferous rocks. See **CARBONIFEROUS SYSTEM**, **TRIASSIC SYSTEM**.

NEW ROCHELLE, *ro shel'*, N Y., in Westchester County, sixteen miles from the Grand Central station, New York City, on an arm of Long Island Sound and on the New York, New Haven & Hartford and the New York, Westchester & Boston railroads. It is a residence suburb and has some large colonial mansions, remaining from the Dutch and English periods. The old Leland Castle, which was known for its fine interior decorations, is now occupied by a Catholic seminary. The city has a well-kept park, a Carnegie Library and a hospital. A monument has been erected to the memory of Thomas Paine, who had his home here for several years. The place was settled in 1687 by Huguenots, some of whom were natives of La Rochelle, France. Population, 1930, 54,000.

NEW SOUTH WALES, a southeastern state of the Commonwealth of Australia, the most populous, though not the largest, of the Australian group. With an area of 308,460 square miles, it is about one-tenth the

size of the Commonwealth, and one-third as large as West Australia, the state of greatest area. At the census of 1931 it had a population of 2,600,428. New South Wales is bounded on the north by Queensland, on the east by the Pacific Ocean, on the south by Victoria and on the west by West Australia. Sydney, the capital, including suburbs, is the third largest city south of the equator.

Physical Features. Near the coast, in an irregular chain, runs the range of mountains which is known as the Great Dividing Range. This chain is called in the northern part of New South Wales the New England Range, in the center, the Blue Mountains, and in the south, the Australian Alps. The Blue Mountains especially, are very rugged and much broken up by canyons and gorges. To the east of these mountains is a generally fertile strip, which is watered by a number of short, rapid rivers. West of the mountains is a great plateau, which at places is of a semi-desert character. The chief rivers of New South Wales, besides the Murray, which forms the southern boundary, are the Darling, the Murrumbidgee and the Lachlan.

On the whole, the climate of New South Wales is healthful, but the range of latitude causes variations of temperature. In the north the climate is well-nigh tropical, and at places on the interior plains the temperatures rises at times to 130°. The temperature of the coast is much lower. The average rainfall on the coast is about fifty inches, while in the interior it is generally less than twenty inches and in places only ten inches.

Resources. New South Wales has rich mineral resources. Coal fields extend over an immense area, and the total production of the mines is about 7,000,000 tons a year. Copper ore of the richest quality has been found in small areas, and the annual output is close to 1,000 tons. Tin exists in large quantities, and iron is very generally distributed. Gold was discovered in 1851, and the total output of gold from that date to the present is about 17,000,000 ounces. The annual silver production averages 60,000 ounces. Zinc and lead are mined.

The scarcity of water renders much of the surface far better adapted for pasturage than for agricultural purposes, though where the necessary moisture is present, heavy crops are raised. The chief products are wheat, maize, oats, barley, potatoes, hay and sugar cane, and vines and fruits of various

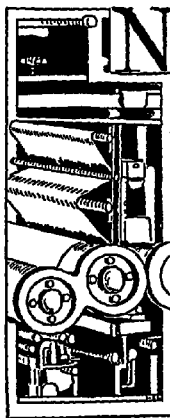
kinds are also produced. The raising of sheep and cattle, however, is the chief employment of the people, and wool is the most important article of export. In 1925 there were about 53,700,000 sheep in New South Wales. Meats, leather, hides and tallow, as well as live stock, are exported. The manufacturing industries of the colony are not of great importance as yet, but they are growing steadily, and they include tanneries, woolen factories, soap and candle works, breweries, shipyards, foundries, machine shops and clothing factories. There are over 5,700 miles of railway in operation, and there is an efficient telegraph system.

Government, Religion, Education. The constitution of New South Wales provides for a governor, a responsible ministry and a parliament of two houses, consisting of a legislative council, appointed by the English Crown, and an assembly, elected by the citizens of the state. Women have the same voting rights as men. The Church of England has the largest membership of any one Church, the Roman Catholic Church is second. No aid is given to any Church by the state. School attendance is compulsory for children from six to fourteen, and education is free from the kindergarten through the high school. At the head of the educational system is the University of Sydney, and there are various colleges, secondary schools and evening schools.

History. New South Wales was visited by Cook in 1770 and was settled in 1788 as a penal colony. This character it retained to 1839. The most important events in its history since that date have been the establishment of representative institutions, the erection of Victoria into a separate colony in 1850, the separation of Queensland in 1859, and the discovery of gold in 1851 and the consequent increase in population and prosperity. New South Wales became one of the states of the Australian commonwealth in 1901.

Canberra, the new Capital City of the Commonwealth, is located in a Federal District in the southeastern part of New South Wales, about 200 miles southwest of Sydney. The Parliament held its first session there in 1927.

Related Articles. Consult the following titles for additional information:
 Australia
 Murray River
 Newcastle
 Sydney



NEWSPAPER, next to the public schools the greatest educational factor in the world. A newspaper consists of large folded sheets upon which printed matter appears in columns. A few papers are but four pages in size, country papers and small-town daily papers may regularly issue eight pages, while great city dailies run from twenty-four pages or more on week-days to eighty or more on Sunday. A Sunday paper of 400,000 circulation which prints eighty pages destroys

a small forest of trees to obtain pulp for a single edition. All paper regularly employed for newspapers is made very largely from wood.

The influence behind a great daily publication cannot well be estimated; it is enormous, for it may have a million readers every day. The power thus reposing in the hands of one man or of a small group of men may be a power for good or it may be an evil influence, this is determined by the honesty of purpose of those responsible or their tendency to prevent the truth in behalf of personal aims.

Growth of Newspapers. Had not inventive genius provided means of rapid printing and typesetting newspapers would yet be small, they would possess little circulation, and their influence would be lessened because they would reach comparatively few people. Rapid presses are the contribution of Richard March Hoe (1812-1866) of New York, who invented the Hoe "Lightning Press" in 1846; to Rowland Hill of England, who did not reach his ideal but gave his plans to others, who used them, to William Bullock of New York, who in 1865 produced a press that would print 10,000 small papers per hour. Hoe's press had superior merits, and the Hoe idea was developed by 1871 into a press called the web-perfecting press that printed 12,000 papers per hour from stereotype plates curved to fit a cylinder. This machine was the forerunner of the marvelous presses of to-day which print, paste, cut and fold papers of eight pages at the rate of 300,000 copies per hour, sixteen pages at the rate of 150,000 per hour; thirty-two pages

at the rate of 75,000 per hour Paper is fed into a press from huge rolls, the sheet used on presses of greatest capacity is six feet wide and passes through the press at the rate of 105 miles an hour

Typesetting for all classes of papers was formerly done by hand, and a hundred compositors might be employed on a metropolitan daily Numerous mechanical devices were invented, but none succeeded in meeting the demand for fast newspaper work until Ottmar Mergenthaler of Baltimore perfected a machine in 1884 known as the *linotype* It was so named because it sets a line of type in a single solid piece with the raised letters on one face of the bar, or "slug" Some great daily papers employ 60 to 75 of these machines This machine is described in the article **LINOTYPE**

Organization of a Newspaper A metropolitan newspaper must employ hundreds of people While the editorial department and policy most concerns the public, a paper depends as much for its success upon its circulation department Combined with these a paper should present a pleasing appearance, for which the mechanical department is responsible Almost of first importance to the financial well-being of the enterprise is the advertising department

A great paper's editorial department is in charge of an editor in chief He is either the proprietor or is responsible to the owners, and is held accountable for everything which appears in its columns Under him is a managing editor, who controls the news editor, telegraph editor, city editor, literary editor, financial editor, etc Under the city editor are from ten to forty or more reporters The editorial department, in addition, employs special correspondents in cities and towns throughout its field, who report local matters of interest which are not touched by the great news-gathering agencies

The circulation manager engages subscription solicitors and directs the distribution of his paper The mechanical superintendent supervises the pressroom and composing room through foremen in each department The advertising manager is in charge of all efforts to keep the advertising columns filled He employs numerous solicitors

The World's News-Gatherers There have been organized great associations whose sole duty is to learn quickly of all important world events and telegraph the facts relating

to them to newspapers which contract for the service The foremost organization of the kind in America is the Associated Press Following closely in importance and influence are the United Press and the International News Service

Number of Papers. There are nearly 60,000 papers and magazines of all classes in the world Of those publications which are purely newspapers the United States has about 2,300 which are published daily and 11,000 which are issued weekly Canada has about 1,500, of which about 125 are published daily

Related Articles Consult the following titles for additional information

Associated Press Linotype Printing Press
JOURNALISTS

Bennett, James	Howe, Joseph
Gordon	Howell, Clark
Brisbane Arthur	Mackenzie, Wil-
Brown, George	liam I.
Bryan, William J	Northcliffe, Lord
Dana, Charles A.	Pulitzer Joseph
Garrison Wil-	Stead, William T
liam Lloyd	Watterson, Henry
Greeley, Horace	Weed, Thurlow
Hearst, William R	White, William
Hicks, Francis, Sir	Allen

NEWT, a small salamander, in appearance resembling a lizard, found in Europe, Asia and North America The American newt is about four inches long It is green above and yellow underneath, and has a row of red dots along the side It lives in ditches and stagnant waters and feeds on smaller aquatic animals The eggs are laid under water and the young behave much like tadpoles They soon change form and color, becoming bright vermilion all over, and leave the water, to hide under leaves and logs and feed on worms When two or three years old they return to the water to breed Of European species the crested newt, which is olive-brown with white lateral blotches, is widely distributed See **SALAMANDER**

NEW THOUGHT, a new name for an old idea It designates a mental attitude which asserts the power of mind over matter Unlike Christian Science, New Thought does not deny the existence of matter, but affirms that spirit is the ultimate reality, and that circumstances and conditions are largely influenced by the power of mind In other words, "life is what we make it" Philosophically, it is a modification of idealism There are perhaps 300 or 400 centers of New Thought teaching in the United States and Canada

NEWTON, ISAAC, SIR (1642-1727), a famous English natural philosopher and

mathematician, born at Woolthorpe, Lincolnshire His greatest claim to fame lies in his discovery of the law of gravitation He entered Trinity College, Cambridge, and in 1665 took his master's degree A few years later he was made professor there His career was not exclusively academic, for he was at one time a member of Parliament and at another warden of the mint In 1703 he was elected president of the Royal Society, and held the position until his death He was buried in Westminster Abbey, where a beautiful monument has been erected to his memory



ISAAC NEWTON

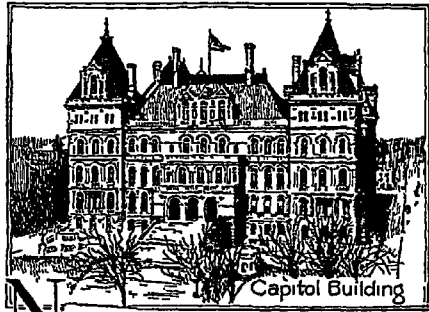
Newton was one of the greatest discoverers of his age Besides giving to the world the law of gravitation, he produced the binomial theorem, and added much to contemporary knowledge of light and color His notes on light and color were published under the title *Optics* Newton made further contributions to astronomical knowledge by inventing a refracting telescope His greatest work is the *Principia Mathematica* (Mathematical Principles), which is the foundation of the later sciences of physics and mathematics

NEW WESTMINSTER, B C, former capital of the province, on the Fraser River, which at this point is a mile wide, and provides an excellent harbor It is served by three great railways, the Canadian Pacific, the Canadian National and the Great Northern Salmon fishing and canning is an important industry, and its lumber mills are among the largest in the world There are fruit canneries, chemical works, paper mills, and railroad repair shops Population, 1931, 17,524.

NEW YEAR'S DAY, the first day of the year, which differs in time in various systems according to the mode of reckoning, thus in Russia, Greece and other countries where the Julian calendar is used, New Year's Day is celebrated on the English 13th of January The Jewish New Year begins September 6 Among the ancient nations the time set as the beginning of the year

differed also, but all treated it with some special observance.

In the early Church any celebration of the day was at first forbidden, but later the day was made a Christian festival Prior to the sixteenth century, even in Christian countries, different days were recognized as the beginning of the year, and it was not until 1752 that January 1 was declared by the Parliament of Great Britain as the opening day of the year for that country In most countries where celebrations have been held on New Year's Day, these have consisted largely in resting from ordinary labors and feasting, and the custom of keeping watch on New Year's Eve and ushering in the new year with mutual good wishes The "ringing in" of the new year with bells and the interchange of visits on New Year's Day are old customs



NEW YORK, one of the thirteen original states, is now the richest and most populous commonwealth of the American Union It is popularly known as the EMPIRE STATE, because of its supremacy in population and industrial and commercial progress, the name New York was bestowed in honor of the Duke of York, in 1664, when the Dutch colony of New Netherland passed under English control

Location and Area The state belongs to the Middle Atlantic group Only the southeastern portion borders on the Atlantic Ocean, but this contact with the sea has been vastly important in determining the supremacy of the Empire State New York City, on its splendid natural harbor, is one of the greatest ports in the world Most of the eastern state line lies adjacent to Vermont, Massachusetts and Connecticut, with Lake Champlain forming part of the Vermont boundary. Lake Ontario and the Saint Law-

rence River separate New York on the north-west from the Canadian province of Ontario, and Quebec lies due north. Lake Erie, the Niagara River and a small section of Pennsylvania bound the state on the west, and New Jersey and Pennsylvania touch it on the south. New York is like an irregular triangle in shape, with the greatest extent (326 miles) from east to west. From north to south it extends 312 miles.

Though first in population among the American commonwealths, the state is twenty-ninth in size, and its area of 49,204 square miles is about one-third that of Montana. It has 1,550 square miles of water surface.

People and Cities In 1920 the population of New York was 10,385,227. According to the census of 1930 the state had 12,588,066 inhabitants, over fifty-five per cent of whom lived in New York City, with a density of 264.2 to the square mile. In density the state was surpassed by Rhode Island, Massachusetts, New Jersey and Connecticut. About three times as many people live in England as in New York, though the two are nearly equal in size. The total urban population in 1930 was about 80 per cent of the whole, for New York had twenty-three cities with populations exceeding 25,000, of which seven had more than 100,000 inhabitants. The first ten cities, in order of size, are New York, Buffalo, Rochester, Syracuse, Yonkers, Albany (the capital), Utica, Schenectady, Binghamton and Troy.

New York has a higher percentage of foreign-born than any other state, the total number being about 3,000,000. Italians are found in greatest number, with Russians, Poles, Germans, and Irish following. Roman Catholics constitute the largest religious body. Second in point of numbers are the Jewish congregations, and among the Protestant denominations the Methodists are most numerous, closely followed by the Episcopalians and Presbyterians.

Surface Features New York has a great diversity of surface, but it is easily divided into six physical regions, including Long Island. The first is the Adirondack region, which occupies all of the northern and eastern portions and comprises over 5,000 square miles. This section is characterized by mountains which rise abruptly, beginning a short distance west of Lake Champlain. The Adirondacks are comparatively low mountains, Mount Marcy, the highest peak, at-

taining an elevation of only 5,844 feet. Their sides are heavily timbered with pine, spruce and other woods, and the valleys contain numerous lakes. Vast tracts of this region are still wild forests. A large state park has been created in the heart of these mountains, in order that the forests may be preserved. To the south, the mountains slope to the Mohawk Valley, and to the southwest they descend to the lake shore plain, which borders Lake Ontario.

The second mountain region occupies a narrow belt in the southeastern border, extending north to about the head of Lake Champlain. This contains an extension of the Appalachian Mountains, which cross New Jersey, and the border of the Hoosac range, forming the boundary between Massachusetts and New York. It slopes gradually towards the Hudson River and is a well-watered and fertile region, not very abrupt and easily cultivated.

West of this and south of the Mohawk valley is the Catskill region, which is a somewhat broad plateau, upon which rise the Catskill Mountains, covering an area of over 1,000 square miles. These are in the form of a group, rather than a range, and their highest peak, Slide Mountain, has an altitude of 1,205 feet. Fifty-eight other peaks reach over 3,000 feet. Many of their slopes are wooded, the intervening valleys are fertile, and this region, like that of the Adirondacks, is a favorite summer resort.

Extending westward from the Catskill region and covering that portion of the state between the southern boundary and the lake shore plain and Mohawk Valley is the great plateau region, well watered by numerous streams and lakes, and valuable for agricultural products. The southern part of this is quite broken, and along the Pennsylvania line the counties contain numerous high hills and deep valleys. The highest part of this plateau is in Otsego County. Here the Delaware and the Susquehanna rivers have their sources. The northern part of the plateau consists of undulating hilly country, dotted here and there by patches of woodland, but mostly under a high state of cultivation.

To the north of this is the lake shore plain, which rises gradually from Lake Ontario in two terraces, the first of which was the former shore of the lake. This plain is divided near its western extremity into two sections by a formation of hard limestone, forming

the cliff over which the cataract of Niagara plunges into the gorge of Niagara River, and it is also over this terrace that the Erie Canal descends at Lockport. The surface of this region is slightly undulating, with a gentle slope towards the lake. Extending from the southeast point of Lake Ontario to the Hudson River in the vicinity of Albany is the low, narrow valley of the Mohawk River, characterized by its nearly level slope. It is the only natural east-west highway through the Appalachian range, and afforded the natural route for the construction of the Erie Canal, to which New York owes so much of its industrial prosperity. Long Island is a part of the coastal plain and is low and nearly level.

Rivers and Lakes. The drainage of New York is nearly as complex as its surface. With the exception of the northeastern counties, the eastern part is drained through the Hudson River, which is the most important stream wholly within the state. Its chief tributary, the Mohawk, waters the central portion. The northeastern portion is drained through Lake Champlain into the Saint Lawrence, the northern counties are drained by numerous rivers directly into this stream, while the lake shore plain contains a few short rivers flowing into lakes Ontario and Erie. The Delaware and the Susquehanna have their sources a little east of the center. The extreme southwestern part is drained through the Allegheny River into the Ohio, and thence to the Mississippi. Many of the streams contain deep gorges and beautiful waterfalls. Chief among the latter are Niagara Falls, Glens Falls and Watkins Glen; the falls of the Genesee River, Taughannock Falls, near Cayuga Lake, the highest in the state, having a fall of 210 feet, and the falls of the Mohawk, where it enters the Hudson, near Cohoes.

New York contains a large number of lakes, either wholly or partly within its boundaries. Located in the Adirondack region, in the region just to the south of it and in the central part of the state, are hundreds of lakes of all sizes, adding much to its scenic beauty. Worthy of note in the eastern part is Lake George, about forty miles in length. In the plateau region, directly south of Lake Ontario, is a group of long, narrow, navigable lakes called the Finger Lakes, nearly parallel to one another, with their greatest length from north to

south. The most important of these are Cayuga, Seneca, Canandaigua, Onondaga and Keuka. To the northeast of these is Lake Oneida, and in the southwestern part of the state is Chautauqua Lake, noted as a summer resort.

Climate. The climate is varied, with a range wider than that of any of the other Atlantic states. Those portions which are under the influence of ocean, sound and lake winds are more even in temperature. Other regions suffer severely from the early frosts of autumn and the late frosts of spring, from extremes of heat in summer and of cold in winter. In the Adirondack region the summer is delightful, but the winters are long and severe. The mean annual temperature of the state is 47°, the average annual precipitation is about forty-one inches.

Mineral Resources. In the Adirondack region there are valuable deposits of iron ore, the annual yield of which is about 1,500,000 tons in favorable years. The greater part of the output is taken from the mines along the southeastern shore of Lake Champlain. Among the states, New York is fifth in the production of iron ore. Clay suitable for the manufacture of brick, tile, pottery, terra cotta and porcelain is found in abundance along the Hudson and in Long Island, and the annual value of clay products exceeds \$18,000,000. There are also profitable quarries yielding granite, limestone, marble, trap rock and sandstone, the yearly production being valued at about \$7,000,000. In the output of its quarries New York is next to Pennsylvania and Vermont. Over 9,000,000 barrels of Portland cement are produced annually, and in this commodity New York ranks with the first five states. New York and Michigan are the two leading salt states, both states have been producing over 10,000,000 barrels annually for years, and the output of New York has reached over 14,000,000 barrels. In the mining of gypsum and the production of fibrous talc New York ranks first among the states, and it is also a leading state in the production of aluminum, emery, abrasive garnet, graphite, millstones, feldspar, iron pyrite and infusorial earth. Other important mineral resources include crude petroleum and natural gas with an annual value of over \$15,000,000. The Saratoga mineral springs are world-famous, and are being developed by the state government. There are about forty similar

springs The total value of the mineral output is about \$50,000,000

Agriculture More than half of the state is under cultivation, and New York ranks twelfth among the states in value of farm products The rainfall is abundant, and the climate is well suited to all products that can be raised in a medium temperate climate In general, the farms are small and under a high state of cultivation About 5,000,000 acres are devoted to hay, which is the leading crop in value Among the cereals, oats and corn are most important

The variety of surface, the means of transportation and the variations in climate give agriculture a wide diversity of interests The counties along the lower part of the Hudson are favorably situated for market gardens and for producing dairy articles for the city trade Through the plateau regions, the soil and climate are better suited to the growing of cereals and fruits, and here large quantities of potatoes, corn, oats, beans, apples, peaches and plums are raised In the northwestern part, which includes the western slope of the Adirondack region and the eastern portion of the lake shore plain, the farmers are chiefly engaged in dairying, producing butter and cheese in large quantities The bulk of the cheese produced in the United States comes from New York and Wisconsin This industry also extends quite generally across the central part of the state In the central counties hops are extensively raised The raising of live stock is confined very generally to dairy cows and other cattle, while horses, sheep and swine are found in sufficient numbers to supply local demand Large quantities of grapes are raised in Western New York and in the Finger Lakes region

Manufactures New York is the leading state in the Union in manufactures, both in extent and variety of products, which include almost everything that is made Though chiefly centering around New York City and Buffalo, the factories are widely distributed through other parts of the state The forest regions of the Adirondacks and Catskills give rise to the manufacture of considerable lumber in these localities

The most important industry with respect to amount and value of products is the manufacture of men's and women's clothing, and in this activity New York easily leads all the other states The state is also first in printing and publishing, and New York City is

the headquarters of scores of newspapers and periodicals The manufacture of foundry and machine-shop products, including typewriters, sewing machines and agricultural tools, is next in importance, with the textile industry following closely New York is one of the leading textile states, and in some special lines, including the manufacture of carpets and rugs, it holds first rank This group of industries includes the making of knit goods and hosiery, cottons, woollens, worsteds, felts and silk Other lines of manufacture in which New York has an important place are slaughtering and meat packing, the making of flour and grist mill products, and the manufacture of tobacco goods

Troy is the great American center for the manufacture of collars, cuffs and shirts, while Rochester leads in the production of optical instruments and cameras The great water power developed at Niagara Falls has fostered numerous industries in that part of the state, some of which are found nowhere else in the country Among these are plants for the production of aluminum, nearly the whole output of which is made here Many heavy industries are centered in Buffalo and vicinity, including steel works and the manufacture of airplanes Canning is also a thriving industry, especially in the central part of the state The output includes milk products, large and small fruits, vegetables and soups

Transportation and Commerce The state is amply supplied with railways and navigable streams and canals The New York Central railroad extends from New York City northward to Albany, thence westward to Buffalo The system includes numerous other lines acting as feeders for it The Erie, the Lackawanna and the Lehigh roads are also important parts of the state's railway system The total railway mileage is about 9,000 There are also about 1,100 miles of navigable waterways, including the State Barge Canal, which replaced the Erie Canal The state highway system comprises more than 14,000 miles of improved roads Air transport systems connect the large cities and extend to all parts of the country

In commerce New York surpasses all other states About one-third of the exports and two-thirds of the imports of the United States pass through the port of New York In an average year vessels of a tonnage of

25,000,000 clear the port of New York. Besides this, much of the domestic traffic between the East and the West passes through the state, the Barge Canal accounting for over 4,000,000 tons, and there is also an enormous coastwide trade.

Government By the present constitution, adopted in 1894, the legislature consists of a senate of fifty-one members, chosen for two years, and a house of representatives, called the assembly, of 150 members, chosen annually. The membership of both houses is apportioned by districts according to population, but county lines are not broken in forming these districts. The constitution provides that no one city (meaning New York City) can ever have more than half of the membership of the state senate. The executive department consists of a governor, a lieutenant-governor, a comptroller, and an attorney-general elected for two years. The other officers including the secretary of State and Director of the Budget, as well as administrative boards having charge of charities, health, public works and conservation, are confirmed by the senate.

The state courts consist of the court of appeals, which is the highest court, and is composed of a chief justice and six associates, elected for fourteen years, a supreme court, composed of 101 judges, each elected for fourteen years, four appellate divisions of the supreme court, county courts, surrogate courts, city courts, justices of the peace, police justices and a court of claims.

Cities and towns manage their local judicial affairs through courts which they establish under acts of the legislature. Because of the large number of cities within the state, they have been divided by the legislature into three classes, the first class including those of 175,000 or more inhabitants, the second including those between 50,000 and 175,000 inhabitants, and the third, those below 50,000 inhabitants. Each class is allowed to organize its government according to general laws established by the legislature.

Education. The public schools are under the control of the state board of regents, consisting of twelve members elected by the legislature and known as the University of the State of New York. The regents are elected for twelve years, one retiring each year. The executive head of this body is the commissioner of education, who has general

charge of all common, high and special schools supported by the state. A deputy commissioner and five assistant commissioners aid him in his responsibilities. There are no county superintendents in New York State. The local supervisory unit, outside of cities and towns of 4,500 people and upward, is the supervisory district, under a district superintendent. In 1925 central rural schools were authorized. Adjoining school districts may unite to form a free-school union district. Villages of 4,500 or more inhabitants which employ a superintendent of schools, and cities are also outside this supervision. The state maintains state colleges for teachers at Albany and Buffalo, and normal schools at Brockport, Cortland, Fredonia, Geneseo, New Paltz, Oneonta, Oswego, Plattsburg and Potsdam. There are three training schools for teachers in Greater New York, and similar institutions at Albany, Buffalo, Cohoes, Jamestown, Rochester, Schenectady, Syracuse, Watertown and Yonkers. Special training classes are also a feature of the high schools.

New York has scores of colleges, universities and special schools. The largest of these is Columbia University, located in New York City, on Morningside Heights. Another notable university is Cornell, at Ithaca. Its agricultural college is supported by the state while the other colleges of the university are privately endowed. There are, besides, six state-supported agricultural schools. New York University, with its two divisions, one in the Bronx and one at Washington Square, New York City, is also a notable institution. It is not a state university. Under national control is the United States Military Academy at West Point. The following list gives the most important of the other institutions of higher learning.

Adelphi College, Garden City
Buffalo University, Buffalo
Clarkson Technical School, Potsdam
Colgate University, Hamilton
College of the City of New York, New York
Elmira College, Elmira
Fordham University, New York
Hamilton College, Clinton
Hobart College, Geneva
Manhattan College, New York
Niagara University, Niagara
Polytechnic Institute, Brooklyn
Pratt Institute, Brooklyn
Rensselaer Polytechnic Institute, Troy
Rochester University, Rochester
Saint Lawrence University, Canton
Smith College (for women), Geneva
Syracuse University, Syracuse
Union University, Schenectady
Vassar College (for women), Poughkeepsie
Wells College (for women), Aurora.

Items of Interest on New York

In area New York is equal to three-fourths of all New England, but is only one-fifth as large as Texas

The latitude of the southern part of the state is about the same as that of Madrid and Naples

For thirty miles, between Weehawken, N J, and Haverstraw, N Y, the Hudson has cut a deep channel between high cliffs of volcanic rocks, these cliffs, called "The Palisades," are famous for their scenic beauty.

In recent years there has been a movement towards the preservation of the forests in the Adirondacks and Catskills, so that the state now has forest reserves covering about 2,250,000 acres

The state ranks next to Vermont in maple sugar production

In manufactured products New York leads all other states, of thirty-nine "chief" industries enumerated in the United States census reports, New York stands first in twenty-seven

The total power utilized in New York manufacturing is approximately 4,000,000 horsepower

Troy makes 85.8 per cent of the collars and cuffs made in the United States, while the whole state makes 92.3 per cent of the total for the country

Over a dozen lines of steamships ply the lakes from Buffalo, about twelve great trunk lines of railroad meet there, it is also the western end of the State Barge Canal

The grain elevators of Buffalo have a capacity of above 50,000,000 bushels Buffalo is the center of a great milling industry

The water system of New York City could supply all the world with drinking water, and its electric lines, elevated, surface and subway, carry nearly twice as many passengers in a year as travel on the steam railroads of the entire country

How does New York compare with other states in the extent and variety of its manufactures?

What recent legislation has been enacted?

In value of fishery products New York ranks third among the Middle Atlantic states, the yield has an annual value of about \$5,000,000 Oysters are the most important catch

New York is next to California in amount of area devoted to vineyards Horticulture is a thriving industry, and florists find a ready market for hothouse plants

New York's dairy industry ranks the state among the leaders in the country The production of cheese amounts to over 100,000,000 pounds a year

The oil fields of New York are a continuation of those in the neighboring state of Pennsylvania

The state has a special department for the conservation of natural resources, and two public service commissions, one of which acts for New York City

There are forty-five congressional representatives for the state

In 1874 the death rate in New York City was 27.9 in every thousand In 1931 it was 10.92 in a thousand The birth rate in 1931 was 16.31, a decline of 14.07 per thousand since 1914

Questions on New York

To what group of states does New York belong?

What states form its boundaries? What waters?

How does New York compare in size with California? With Texas?

Into how many physical regions is New York divided? How are they characterized?

What is the most important river in the state?

Name three important falls How have they affected the industries of the state?

How does New York compare with other states in the production of iron ore?

In the production of what minerals does New York rank first?

What are the chief agricultural products?

How does New York rank in the production of buckwheat, potatoes and apples?

Institutions. The state maintains over 500 charitable and penal institutions, under the supervision of boards of charities, correction and lunacy. The asylum for feeble-minded children is at Syracuse, and that for feeble-minded women at Newark. The school for the blind is at Batavia, and that for crippled and deformed children at West Haverstraw. The hospitals for the insane are at Willard, Binghamton, Buffalo, King's Park, Gowanda, Middletown, Ogdensburg, Poughkeepsie, Rochester, Utica and Central Islip. At Matteawan and Dannemora there are asylums for insane criminals. The penal institutions are in charge of a superintendent of state prisons and include the prisons at Ossining (Sing Sing), Auburn and Clinton, and the Great Meadows prison at Comstock. Penitentiaries for the confinement of offenders who receive short sentences are county institutions and are located in New York, Kings, Erie, Monroe, Clinton and Albany counties. There are also a number of reform schools and industrial institutions for juvenile offenders, a house of refuge for women, and epileptic colonies.

History. In 1609 the Frenchman Champlain and the Englishman Hudson, who were in the employ of the Dutch, both entered the territory of New York, the former descending from Canada by way of Lake Champlain, the latter ascending the Hudson River. Owing to their alliance with the Iroquois Indians, the Dutch were the first to establish prosperous settlements, and they maintained a profitable fur trade for years. In 1624 Albany was settled, and two years later New Amsterdam (now New York City) was founded. The Dutch came into constant collision with the English on the east and the Swedes and English on the south, and finally were forced to relinquish their hold on the territory in 1664, when New York, New Jersey and Delaware were all conquered by England and granted to the Duke of York.

For a time the colony prospered under liberal rule, but it was later made the victim of worthless and unscrupulous governors. It suffered severely by the invasions of French and Indians in the wars of the eighteenth century. In the early days of the pre-Revolutionary struggle the colony was about evenly divided between Tories and patriots, but the latter gradually gained the upper hand, and some of the most defiant actions of the whole struggle were taken by New

York. An independent government was organized in 1775, and a constitution was adopted in April, 1777, which remained in force forty-five years. The second constitution was adopted in 1822, the third in 1846, the fourth and present one in 1894. It has since been amended.

New York was one of the first states to ratify the Articles of Confederation (1778), but it opposed a strong Federal government, two of its three delegates withdrawing from the constitutional convention. It was the eleventh state to ratify the Constitution (July 26, 1788). The Federalists were at first dominant in the state, but after 1800 for more than twenty years their opponents were in power. The Erie Canal was constructed between 1817 and 1825. Though a free state, New York was divided in the slavery struggle, and during the early years of the war the Democrats, or anti-administration party, were in power. Nevertheless, it was one of the strongest supporters of the Union cause and furnished 467,000 troops to the Federal army.

Within recent years many progressive laws regarding workmen's compensation, child labor, pure food, mothers' pensions, and old age pensions, have been passed, and in November, 1917, by a referendum vote the state adopted woman suffrage. The same year the state organized a state police force similar to the one which had been operating for years in Pennsylvania. The state prohibition enforcement act was repealed in 1922 and in 1933 New York was the 6th state to vote for the repeal of the 18th Amendment.

Related Articles. Consult the following titles for additional information:

CITIES		
Albany	Hudson	Ossining
Amsterdam	Ithaca	Oswego
Auburn	Jamestown	Plattsburg
Batavia	Johnstown	Poughkeepsie
Binghamton	Kingston	Rensselaer
Brooklyn	Little Falls	Rochester
Buffalo	Lockport	Rome
Cohoes	Middletown	Saratoga
Corning	Mount Vernon	Springs
Cortland	Newburgh	Schenectady
Dunkirk	New Rochelle	Syracuse
Elmira	New York	Troy
Fulton	Niagara Falls	Utica
Geneva	North	Watertown
Glens Falls	Tonawanda	Watervliet
Gloversville	Ogdensburg	Yonkers
Hornell	Olean	
RIVERS		
Allegheny	Hudson	Niagara Falls
Delaware	Mohawk	and River
MOUNTAINS		
Adirondack		Catskill
LAKES		
Cayuga	Erie	Oneida
Champlain	George	Seneca

HISTORY

Clinton, DeWitt
Erie Canal
Hudson, Henry

New York State
Barge Canal
Revolutionary War
in America

EDUCATION

Barnard College
Butler, Nicholas M.
Columbia University
Cornell University
Draper, Andrew S.
Military Academy,
U S

New York, College of
the city of
New York University
Syracuse University
Vassar College

UNCLASSIFIED

Hall of Fame
Liberty, Statue of
Long Island

Palisades
West Point



Peter Stuyvesant,
One of the first citizens

NEW YORK CITY, one of the greatest seaports in the world, the metropolis of the United States and of the Western hemisphere, and the home of over half of the residents of New York state. In this city there are more people than live on the entire continent of Australia, or in any one of half the nations of the earth. It is the largest city in the world under a single municipal government, for its population, more than 7,000,000, exceeds that of London proper by about a million. If the metropolitan area of London be included the English metropolis may be called the world's largest city, but the scores of towns and villages that surround that capital are not strictly within its corporate limits. In 1920 New York had a population of 5,620,048, this increased to 6,930,446 in 1930, it exceeded 7,000,000 the next year. It is a combination of five boroughs (Bronx, Brooklyn, Manhattan, Queens and Richmond), each a great city in itself, and it extends over a dozen islands.

Location and Geography It is usually said that New York is situated at the mouth of the Hudson River, which flows into the Atlantic Ocean through New York Bay. A statement of this sort, however, gives one no idea of the somewhat complicated geography of this huge port. The smallest borough, out the nucleus and business center of the city, is the long, narrow island of Manhattan, which is bounded on the west by the Hudson River, on the east by the Harlem and the East rivers, the latter connecting New York Bay and Long Island Sound, on the north by Spuyten Duyvil Creek, which joins the

Harlem and the Hudson, and on the south by the great Bay which forms one of the finest harbors in the world. Manhattan Borough is about thirteen miles long and less than two miles in average width, but it receives annually imports whose value exceeds that of the combined imports of South America, Africa and Australia. Several small adjacent islands belong to this borough.

North and east of Manhattan lies a growing residential section, the borough of the Bronx (constituted a separate county in 1913). It is separated from upper Manhattan by the Harlem River and Spuyten Duyvil Creek. A portion of the western boundary of the Bronx is formed by the Hudson River, and it is bounded on the east and south by Long Island Sound and the East River. The borough of Brooklyn, in the southwestern corner of Long Island, and coextensive with Kings County, was even at the time of its annexation (1898) a busy city of a million inhabitants. Its population now exceeds 2,560,000. This borough has water boundaries on three sides, its water front including the East River, New York Bay and the Atlantic Ocean. Coney Island, a famous pleasure resort, is a part of the borough. Lyng north and east of Brooklyn is the borough of Queens (Queens County), including several Long Island towns and cities, and a number of islands in Jamaica Bay. The fifth borough, Richmond County, is formed by Staten Island, which lies between Brooklyn and the New Jersey mainland.

Besides the islands mentioned, Greater New York includes Welfare, Ward's and Randall's islands, in the East River, containing the city benevolent and penal institutions, Governor's Island, Liberty (formerly Bedloe's) Island and Ellis Island, in Upper New York Bay, and several smaller islands. Governor's Island, which has an area of sixty-five acres, is used by the Federal government for military purposes. Liberty Island, near the north end of the Bay, contains the famous colossal statue, *Liberty Enlightening the World*, popularly known as the Goddess of Liberty. Ellis Island is internationally famous as an immigrant-receiving station of the United States government. The area of the entire city, including water surface, is 327¼ square miles, there are 285 square miles of land surface.

Upper New York Bay is one of the finest harbors in the world, having an area of near-

ly fifteen square miles. It is connected with the Lower Bay, which is practically a part of the Atlantic Ocean, by a strait called the Narrows, which separates Brooklyn and Staten Island. This strait, about a mile wide, is guarded by two obsolete forts, Hamilton and Wadsworth, the former in Brooklyn, the latter on Staten Island.

Famous Streets. By far the longest and the most famous thoroughfare in New York is Broadway, which runs northward from Battery Park, at the southern end of Manhattan Island, and is continued under the same name far beyond the limits of the borough in which it starts. For the first two miles it extends almost due north, dividing the borough into nearly equal parts. It then swerves to the northwest, and after reaching the vicinity of Central Park, runs parallel with the Hudson for several miles. In the lower Broadway sections are found most of the towering commercial buildings that give the city its characteristic skyline. Above 40th Street Broadway becomes the center of a busy theatrical district, in which scores of theaters, vaudeville halls and moving picture houses contribute to the reputation of the "Great White Way." Still farther north it traverses the better-class residential districts.

Wall Street is known throughout the world as the financial center not only of New York but of the Western hemisphere. In fact, the name has come to be used as a synonym for American capitalism. This street is not long, as it extends only from lower Broadway (at Trinity Church) to East River, but it is of international importance. Fifth Avenue, the name of which stands for wealth and luxury, is another famous thoroughfare. It runs northward from Washington Square, and above 59th Street skirts the eastern side of Central Park. From 30th Street to 59th this broad, handsome avenue is the center of an exclusive shopping district. On it also are pretentious churches, club houses, hotels and palatial homes.

Riverside Drive, which follows the Hudson River northward from 72nd Street, is generally considered the most beautiful avenue in the city, for it faces the river along its entire length. However, it is not longer the section given over to the homes of the ultra-fashionable, for Park Avenue, north from Grand Central Station, boasts that distinction. Park Avenue is the extension of Fourth

Avenue north of 32nd Street. Harlem Speedway, along Harlem River, and Grand Concourse, northward in the Bronx, are popular travel routes.

Parks and Monuments. Small squares or parks serve as breathing places in the densely-crowded city. Washington Square, Union Square and Madison Square are among the most noted of these. All are surrounded by fine buildings, and each has its own peculiarities. At the south end of the island is Battery Park, in which, in the building which was formerly Castle Garden, is located the Aquarium. Riverside Park is a strip of land running along the Hudson.

Central Park is the greatest park in New York, and is one of the finest in the world. It is a rectangle lying between Fifth and Eighth avenues and 59th and 110th streets; Eighth Avenue here is Central Park West. The northern half of the park has been left almost in a state of nature, and nothing could be more beautiful, for it is hilly and heavily wooded, abounding in high rocky ledges. Among the other attractions of Central Park are beautiful landscape gardens, walks and bridle paths, lagoons, statuary, playgrounds and a zoological garden. The largest and most attractive park in Brooklyn is Prospect Park.

In the borough of the Bronx are Bronx Park, Van Cortlandt Park and other tracts, great portions of which are still entirely in a state of nature. In the Bronx Park are the zoological gardens and the botanical collection, which are visited daily by thousands of people. In Van Cortlandt Park golf links, ball grounds and polo grounds afford opportunities for summer games. A delightful seaside resort is Pelham Bay Park, on Long Island Sound.

New York's most impressive monument is the bronze statue of *Liberty Enlightening the World*. In Washington Square is the marble Washington Arch, completed in 1892 and erected by popular subscription at a cost of \$123,000. In Central Park is a granite obelisk known as Cleopatra's Needle. This obelisk was hewn and inscribed by Thothmes III, although one of its sides is also inscribed with the victories of Rameses II, a king who lived three centuries afterward. The obelisk was presented to the city of New York by Ismail Pasha and was brought to America at the expense of William H. Vanderbilt.



STATUE OF LIBERTY, IN NEW YORK HARBOR
The gift of the Republic of France to the people of the United States



THE EMPIRE STATE BUILDING, NEW YORK CITY
Rising 1,250 feet in height, at Fifth Avenue and 34th Street.

There are a number of beautiful statues and fine figures in marble and bronze in different parts of the city, especially in Central Park and the public squares. Among these are a granite statue of Alexander Hamilton, a bronze statue of Shakespeare by J. Q. A. Ward, in Central Park, a noble equestrian statue of General Sherman by Saint Gaudens, on the Plaza at Fifth Avenue and 59th Street, a bronze figure of Peter Cooper by Saint Gaudens, south of Cooper Union, a bronze statue of Lafayette by Bartholdi, in Union Square, and the colossal figure of Washington by Ward, at the Sub-treasury in Wall Street.

The tomb of General Grant is a marble temple at the north end of Riverside Park, and is one of the most conspicuous objects in the northern part of the city. The Soldiers' and Sailors' Memorial Arch fronting Prospect Park, Brooklyn, and a monument to Civil War Soldiers and Sailors, on Riverside Drive, are notable.

Public Buildings The city government centers in the City Hall, more than a century old, in City Hall Park, on lower Broadway, and in the new Municipal Building, near by, 24 stories high. On Center and Chambers streets is the imposing Hall of Records, and not far distant is the Criminal Courts Building. The "Tombs," or city prison, is connected with the Criminal Courts Building by a "Bridge of Sighs." On Broadway and Park Row is a branch of the postoffice, formerly the main building, a handsome structure built in Doric and Renaissance style. The main postoffice is west of the Pennsylvania Railroad station, on Eighth Avenue, between Thirty-first and Thirty-third streets.

There are in the city ninety-five skyscrapers each thirty stories or more in height, and fully 500 that exceed twenty stories. For a dozen years after it was built the Woolworth Building, on lower Broadway, 55 stories, 767 feet in height, was the world's tallest business structure. Now it is overtopped by half a dozen. To-day the world's tallest skyscraper is the Empire State Building, 102 stories, 1,250 feet in height, the second tallest is the Chrysler, 77 stories, 1,046 feet. In the financial section, on or near Wall Street, are Citicorp Service, 67 stories, 950 feet, Bank of Manhattan Co., 70 stories, 927 feet, City Bank Farmers Trust, 59 stories, 750 feet, Irving Trust, 51 stories, 638 feet. In the 42nd Street area are 500 Fifth Avenue Building, 58 stor-

ies, 699 feet, Lincoln, 53 stories, 673 feet, Chanin, 54 stories, 623 feet. In the new Rockefeller Center development the R C A Building towers 70 stories to a height of 853 feet. This list does not include all of the monumental structures.

Churches The most noted church of New York is probably the old Trinity Church, located on Broadway at the head of Wall Street. In the churchyard are buried some of the famous personages of early times, including Alexander Hamilton. Grace Church, on Broadway and 11th Street, Saint George's, with its lofty spires, on Stuyvesant Square, and the Roman Catholic Saint Patrick's Cathedral, on Fifth Avenue and 50th Street, are all interesting churches. The last is the finest Gothic edifice in America; it is built of white marble, in the form of a Latin cross, and it has two beautiful spires rising to a height of 323 feet. On a rocky bluff on Morningside Park, is the Episcopal Cathedral of Saint John the Divine, now in process of construction. When completed, it is expected to take a leading place among the great churches of the world, both in size and in beauty of design. Saint Paul's Chapel, on lower Broadway, is the oldest church edifice in the city, constructed in 1754-56. An ancient graveyard is in the rear of the church.

The quaint little Church of the Transfiguration ("Little Church 'round the Corner"), on 29th Street near Fifth Avenue, is a place of special veneration to actors. On Fifth Avenue are half a dozen notable churches, towering amid skyscrapers. Others of note include the John Street Methodist, the Saint Nicholas Dutch Reformed, the Broadway Tabernacle, the Jewish Temple Emmanuel, and the Riverside Church, near the tomb of Grant. See illustration with article ARCHITECTURE.

Hotels and Clubs Within a single square mile in the heart of Manhattan there are enough hotels to serve 50,000 people. Among the first-class hostels are the Shelton, Roosevelt, Waldorf-Astoria, Ambassador, Edison, Biltmore, Prince George, McAlpin, Belmont, Murray Hill, the Commodore, Astor, Ritz Carlton and Pennsylvania. The Commodore and the Pennsylvania have over 2,000 rooms each. The Plaza and the Majestic are well-known family hotels, and the Martha Washington, on 29th Street, is reserved for women. Of more than 200 clubs, of



special note are the Union League, the Lambs, the Players, the New York Athletic, the New York Yacht, the Army and Navy and the Knickerbocker. Many of the buildings housing these organizations are beautiful and imposing structures.

Institutions The most important universities in the city are Columbia, on Morningside Heights, and New York University, in the Bronx. The College of the City of New York, at 138th and Convent Avenue, is a free institution for men; Hunter College is for women, at Park Avenue and Sixty-eighth street. There are scores of art, musical and professional schools, and various seminaries and colleges under denomination con-

side Heights, and New York University, in the Bronx. The College of the City of New York, at 138th and Convent Avenue, is a free institution for men; Hunter College is for women, at Park Avenue and Sixty-eighth street. There are scores of art, musical and professional schools, and various seminaries and colleges under denomination con-

trol Cooper Union is a notable institution for working people

New York has one of the largest city public libraries in the world, the collections of which are housed in a white marble building on Fifth Avenue between 40th and 42nd streets Besides its great collection of books and manuscripts, the library possesses many valuable paintings, sculptures and pieces of pottery Of the various museums the most famous is the Metropolitan Museum of Art The museum building, a handsome structure on Fifth Avenue side of Central Park, contains original paintings and statuary, together with reproductions of famous creations of foreign lands, collections of jewels and porcelain and miscellaneous objects of art of great value The museum is open to the public daily On the west side of the Park is the American Museum of Natural History, a magnificent building in which is one of the finest collections in natural history to be found in the New World The Aquarium at Battery Park is widely known for its collection of salt and fresh water life

Water Supply See **AQUEDUCT**, **CROTON AQUEDUCT**.

Transportation and Communication There are numerous railroads connecting New York with other cities in the United States, submarine cables, wireless telegraph stations, radio, and telegraph and telephone connections place the city in communication with all parts of the world The principal railways are the Erie, the New York, Ontario & Western, the Lackawanna, the Philadelphia & Reading, the Lehigh Valley, the Central of New Jersey, the New York & Harlem River, the New York Central & Hudson River, the Pennsylvania, the West Shore, the Baltimore & Ohio and the New York, New Haven & Hartford The New York Central and the New York, New Haven & Hartford occupy Grand Central Terminal, 42nd Street and Park Avenue, Manhattan The Pennsylvania station, located on 33rd Street and Seventh Avenue, is connected with New Jersey by tunnels under the Hudson River, and with Long Island by tunnels under the East River. The other lines terminate on the west bank of the Hudson and transfer passengers and freight by ferries or tunnels The nation's important bus lines terminate here.

New York has electric railways running the length of the Island on several of the principal streets and avenues, numerous

cross-town lines and a very complete system of elevated railway lines, which run from the south end of the Island into the Bronx, Queens, and Brooklyn Besides these, there are subway lines with a network of 700 miles of rails The urban transportation system of New York is the most extensive of any in the world The surface lines are gradually being supplanted by comfortable buses

Ferries cross the Hudson and East rivers Tunnels under these rivers also connect Jersey City and Hoboken, N J, with Manhattan, the Bronx, Brooklyn and Queens, carrying throngs of people to and from the city night and day The East River is spanned by four wonderful bridges, the Brooklyn, Williamsburg, the Queensboro and the New Manhattan, all suspension bridges fixed so high above the river as not to impede navigation The Harlem River is also crossed by numerous bridges New York is also connected with New Jersey by the George Washington bridge across the Hudson, and by the Holland tunnel A new tunnel was begun in 1934 to connect midtown Manhattan and the Jersey shore Its Manhattan terminus will be near 42nd Street

Industry and Commerce In manufactures, New York is by far the leading American city The capital invested is enormous, and the variety and value of the articles made is almost beyond estimate The most important industry is the manufacture of clothing the value of the annual output exceeding that of all the manufactures of almost any other American city. In the printing and publishing business New York also far outranks any other city of the United States There are approximately 25,000 manufacturing establishments in the vicinity of New York, and the city is the center of an industrial section that extends into surrounding states.

Under normal conditions about half the foreign commerce of the United States passes through the port of New York, and the coast-wise trade is even larger than the overseas The port facilities for taking care of the vast commercial business are unsurpassed

Government The charter of New York as revised in 1901, has incorporated in it the important provisions which had proved satisfactory in the former city of Brooklyn and other American and European cities The chief changes relate to the establishment of the borough system and to the provisions

which permit different localities to manage most of their own affairs. The executive power of the city is vested in the mayor and the heads of the different boroughs. The mayor, who holds office four years, appoints heads of departments and commissioners, except the comptroller of finance and officials under the control of the borough presidents. He is chairman of the board of estimate and apportionment, which consists of the mayor, the comptroller, the president of the board of aldermen and the presidents of the several boroughs. He is subject to removal by the governor, after a hearing, upon charges.

The president of each borough holds office for four years. He presides over the local improvement board and exerts some powers of a mayor. He is also a member of a board of aldermen and has the same power to vote as any other member of that body. The board of aldermen, consisting of seventy-three members, elected for two years in separate districts is the legislative body, and passes ordinances and resolutions which the mayor has the power to veto, though by a two-thirds vote it may pass laws over his veto, unless they require the payment of money, in which case a three-fourths vote is required.

History. The first white man known to have visited Manhattan Island was an Italian, Giovanni Verrazano, who, sailing in the French service, entered the harbor in 1524. In September, 1609, Henry Hudson, in the service of the Dutch East India Company, explored the harbor and river, and soon after the Dutch began trading with the Indians. But the first serious attempt at colonization began in 1623, when a band of thirty Dutch settlers arrived. Peter Minuit, the first governor, brought with him in 1626 another company of colonists and, having bought Manhattan Island from the Indians for the equivalent of twenty-four dollars, christened the town New Amsterdam.

Under Minuit and his successors, Wouter Van Twiller, Willem Kieft and Peter Stuyvesant, the colony prospered and grew, until in 1653 it numbered about 800 souls. In that year it was incorporated as a city. In 1664 Charles II of England granted the New Netherlands to his brother, the Duke of York, who took possession of the city and renamed it New York. The Dutch regained the city in 1673, but a year later they gave way to the English.

Questions on New York

An outline suitable for the study of a city the size of New York will be found with the article CITY.

How does New York compare in population with London? With Paris? With Berlin?

Describe the geography of Greater New York. What are its water boundaries?

What use is made of the various islands in the vicinity of Manhattan?

Describe the harbor of the city. How is it guarded?

What street is the financial center of the Western hemisphere?

What is the largest park in Manhattan? In Brooklyn?

From what country was the famous obelisk in Central Park transported?

Locate and describe the tallest office building in the world.

What is the "Little Church 'round the Corner"?

What facilities does the city offer the art student?

Would the student of natural history find New York helpful?

How does the city obtain its supply of drinking water?

What modes of transportation are there across the East River?

In what two lines of industry does New York surpass all other American cities?

What powers does the mayor of Greater New York possess?

How is the history of the city connected with that of the Netherlands?

When was New York a capital of the United States?

What is the distance from New York to Chicago? to Washington? to New Orleans? to Denver? to San Francisco?

What is the most famous street?

What is the name of the university with the largest attendance credited to any school in America?

What two great railroad depots are on Manhattan Island?

What part of the state's population is in this one city?

In 1686 the first city charter was issued, and in 1690 the first intercolonial congress was held in New York. The first printing press was established in the city in 1696, the first free school was opened in 1705, and the first newspaper, the *Gazette*, was founded in 1725. In 1732 a stage line was established between New York and Boston, but it was not until twenty-four years later that the Philadelphia stage began running. In the early part of the summer of 1776 a large part of the American troops were quartered in the city, and on July 8 the Declaration of Independence was publicly read to the soldiers and citizens. The next day the statue of George III on Bowling Green was torn down, but in September of the same year the British occupied the city and held it from that time until "Evacuation Day," November, 25, 1783. From 1785 to 1790 Congress met in New York in the old Federal Hall, the site of which is now occupied by the Subtreasury, here Washington was inaugurated in 1789.

In 1807 Fulton's steamer, the *Clermont*, began making trips between New York and Albany, and in 1812 the first steam ferry to Long Island was opened. The completion of the Erie Canal gave an impetus to the growth of the city, which since that time has increased its population at a rate never equaled by any other municipality. Two cholera epidemics, a great fire with much loss of life, a financial panic and several riots were events which seemed serious at the time, but which never delayed the city's progress. For several years after the Civil War the city suffered from political frauds perpetrated by the "Tweed Ring," but in 1871 the ring was effectively broken up. In 1898 the first charter for the organization of Greater New York was adopted, and the history of the city since that date has been one of almost uninterrupted prosperity.

Related Articles titles for additional information	Consult the following
Blackwell's Island	Long Island
Brooklyn	Manhattan Island
Bridge, subhead	Metropolitan Museum
Suspension Bridges	New York College
Castle Garden	of the City of
Cleopatra's Needles	New York University
Columbia University	Sandy Hook
Cooper Union	Statens Island
East River	Subway
Ellis Island	Tammany Society
Hell Gate	Tunnel
Hudson River	Tweed, William W
Liberty, Statue of	

NEW YORK, COLLEGE OF THE CITY OF, a men's educational institution supported by the city of New York. The college was established by the board of education in 1848,

under the name of the New York Free Academy. Its purpose was to provide educational advantages for those unable to pay tuition. It developed steadily, and in 1866 its name was changed to the College of the City of New York. Three years of preparatory work and four of college instruction are given, but there are no graduate courses. In 1917 courses in civil, electrical, mechanical and chemical engineering were instituted. Equipment is free and no tuition fees are required. An evening college is maintained for those who cannot attend day sessions, and there are extension courses. The total enrollment for both day and evening sessions averages over 11,000, which includes about 3,000 women admitted to special courses. Preparatory students, who meet in Townsend Harris Hall, number about 1,600. The faculty numbers over 850. There is a library of 95,000 volumes.

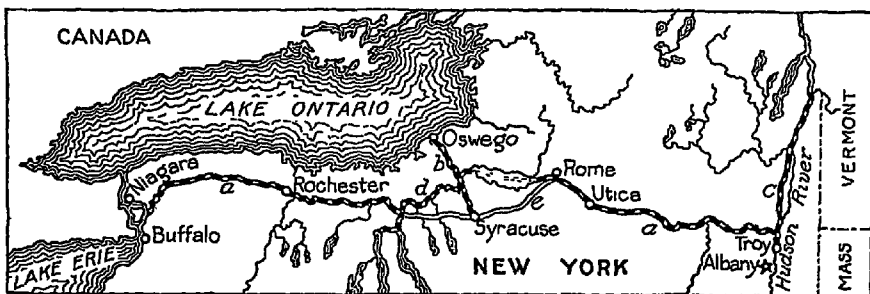
NEW YORK, UNIVERSITY OF THE STATE OF See NEW YORK (state), subhead *Education*.

NEW YORK STATE BARGE CANAL, a canal system in operation in the state of New York, comprising four waterways formerly operated individually. These are the Erie, the Champlain, the Oswego, and the Cayuga and Seneca canals. The Barge Canal is the result of various enlargements and improvements of the four existing canals, the work having been authorized by the legislature and electorate of the state in 1903. Construction began in 1907, and the system was finished and ready for operation in 1917. A practical test of the Barge Canal was made in November, 1917, when two submarine chasers made the trip from Oswego, on Lake Erie, to Troy, on the Hudson. The experiment demonstrated that the great canal was in every respect a success.

Of the four canals comprising the system, the Erie is the most important. It is 339 miles in length, connecting Buffalo, on Lake Erie, with Albany and Troy, on the Hudson. The Champlain Canal, sixty-one miles in extent, runs from Whitehall, on Lake Champlain, to Watervliet, near Troy. The third canal, the Oswego, extends from Oswego, on Lake Ontario, to Syracuse. It is twenty-three miles in length. Of the same length is the Cayuga and Seneca Canal, connecting Montezuma, on the Seneca River, and lakes Cayuga and Seneca. The minimum depth of the Barge Canal is twelve feet, and it varies

in width from ninety-four to 125 feet, except when it follows natural watercourses, when it is occasionally 200 feet wide. There are fifty-seven concrete locks—thirty-five on the

has been in operation. This was organized to give university courses outside the university buildings. The annual enrollment has reached more than 33,000, and averages more



ROUTE OF THE BARGE CANAL

Erie division, eleven on the Champlain, seven on the Oswego and four on the Cayuga and Seneca. These are of standard dimensions, and permit the locking at one time of two boats of about 1,500 tonnage. In connection with the system there are forty dams. To complete the Barge Canal required an expenditure of about \$150,000,000. It is expected that it will greatly decrease the cost of shipping grain and freight from the West to Eastern ports, and be an important factor in the future development of the country.

NEW YORK UNIVERSITY, a nonsectarian institution established in 1831 in New York City. It is partly coeducational, and is not a state university. Its founders wished to have the institution of service to as many as possible, and the different departments were therefore established in centers where they would be available to the greatest number of people.

The university consists of a college of arts and pure science, a school of applied science and a summer school, at University Heights, in the Bronx, a school of Law, a graduate school, a school of pedagogy, a school of commerce, accounts and finances, the Washington Square collegiate division and a women's law class, located in the University Building in Washington Square, a medical school, which is united with the Bellevue Hospital College, at First Avenue and Twenty-sixth Street, and the New York State Veterinary College, at 141 West Fifty-fourth Street. In 1917 Jacob H. Schiff presented a fund of \$50,000 to endow a division of public affairs. Since 1908 an Extramural Division

than 30,000; the faculty numbers about 1,700. The library contains over 350,000 volumes. Memorial Library, at University Heights, contains the Hall of Fame (which see).



Natives cooking in a hot spring

NEW ZEALAND, *se'land*, DOMINION OF, a part of the British Empire, lying in the south seas, over 1,200 miles east of Australia, in a lonely position and so isolated that it is little known by the majority of people. However, it is in many respects the most advanced country in the world, for it has taken many forward steps in the field of economic and social reform, some of which have been followed by other nations.

New Zealand occupies a position in the southern hemisphere whose latitude is comparable to the latitude in the United States from Northern Mississippi to Lake Superior. It consists mainly of two large islands—North Island (44,281 square miles) and South Island (58,092 square miles). A number of small islands are near the mainland, bringing the area of the dominion to 103,722 square miles, about the area of Colorado. See map, with article AUSTRALIA.

Isolation of New Zealand. This dominion of the south seas is 1,233 miles from the nearest large land mass, that being the distance by steamer to Sydney, New South

Wales To other ports of the world the distances are as follows.

Wellington to Melbourne, 1,481 miles
 Wellington to San Francisco, 5,605 miles
 Auckland to Honolulu, 3,836 miles
 Auckland to San Francisco, 5,934 miles
 Auckland to Vancouver, 6,235 miles
 Auckland to Panama, 6,593 miles

The Land. New Zealand may be regarded as a mountainous country, for an almost continuous ridge of rugged mountains runs through the length of both large islands. These range in height from about 5,000 feet to the peak of Mt Cook, west of Christchurch, 12,349 feet high. The range on South Island is called the Southern Alps. On this island are many large glaciers, the largest one, the Tasman, being 18 miles long and a mile and a half wide. The mountain sides are generally clad with virgin forests, and the deeply cut valleys rival in beauty the fjords of Norway. Access from the east to the west coast is through the Otira tunnel, $5\frac{1}{2}$ miles long.

On North Island the general contour is low hills and tablelands, densely forested. The highest peak is volcanic. Of these, Ngauruhoe (7,515 ft.) alone is active. Mt Egmont (8,250 ft.) is a volcanic cone, snow-capped, similar to the cone of Fujiyama in Japan. Others are Tongariro (6,158 ft.), and Ruapehu (9,175 ft.) the highest. There are several lakes of volcanic origin, of which the largest is Lake Taupo, 22 miles in diameter, and of great depth.

New Zealand lies in the path of the cyclones that move eastward across the Southern Ocean. These moisture-laden winds bring a heavy rainfall to the western side of the ranges, the annual rainfall there varying from 100 to 200 inches per year. As the wind passes to the eastward it becomes hot and dry, but often reverses its direction, bringing rain to the eastern districts.

Nowhere in the islands is the sea more than sixty miles distant, and frequently its roaring can be heard many miles inland. The country is famous for its boiling springs, great glaciers, geysers that rival those of the Yellowstone, and fjords like those of Norway and the western coast of Canada.

The coast line of the islands is long—more than 4,000 miles, but good harbors are few, those at Auckland and Wellington being the best.

This section is famous for its thermal lakes, geysers, and boiling springs, the most

active being in the Wairakei Valley. This is the center of the Maori life, where the Maoris still live largely after their old customs.

Natural Resources. With mineral wealth New Zealand is liberally supplied. Coal is obtained in many parts, and the production is about \$9,000,000 a year, copper has been worked on a small scale. Gold is also a great natural resource, it is worked both in North and South Island, and is produced to the extent of \$6,000,000 a year. Silver, copper, tin, antimony and manganese are found. Of the flora, the most characteristic forms are the ferns, of which there are about 130 different species. In some places these form almost the only vegetation over immense districts. Another characteristic plant, and one of great economic value, is the flax plant.

The most noted of the forest trees is the Kauri pine, often 200 feet high, whose timber is of great value. Other forest trees, of great usefulness, are the rimu, or red pine, the totara, the kahikatea, or white pine, and the rata. There is probably not an indigenous mammal in New Zealand. Rabbits and pigs were brought in, and now run wild. Deer have been successfully introduced. The native birds have largely disappeared, but there remain some of beautiful plumage. Among the most notable birds are the tu and the bell-bird, songsters, the kaka, or mountain parrot, a berry-eating bird, which also attacks sheep in remote stations, and two varieties of cuckoo. The gigantic wingless moa is now extinct. The kiwi and weka have rudimentary wings, but do not fly.

Agriculture. The soil and climate of New Zealand are well adapted to the production of every English and American grain, grass, fruit and vegetable. In the warmer valleys, fruits of a semi-tropical character, such as the pomegranate, citron, orange and olive, are raised. The largest crops are oats and wheat, barley is the next largest. Stock raising, especially sheep grazing, and dairy-farming are industries of prime importance. There are about 29,000,000 sheep in the Dominion, and by far the most important exports are wool, hides, frozen meat, butter and cheese.

People and Education. The original natives of New Zealand, called Maoris, are said to have emigrated from the Navigator's or the Sandwich Islands centuries ago. Split up into numerous petty tribes, their numbers

have been so much reduced that they now do not exceed 73,500, all of whom, with the exception of a few hundreds, are located in the North Island. By missionary efforts a great part of them have been converted to Christianity. They have acquired in many instances considerable property in stock and cultivated lands, and in the neighborhood of the settlements they are adopting European dress and habits. Most of the white people not born in New Zealand emigrated to the islands from some part of the British Empire. About seventy per cent are native born.

Elementary education is free, secular and compulsory for children from seven to fourteen years old. Secondary education is provided for in numerous high schools and grammar schools, for attendance in which a small fee is required. At the head of the higher education is the University of New Zealand, with affiliated and endowed Colleges at Dunedin, Christchurch, Auckland and Wellington, and a total enrollment of about 4,500 students. There are also training schools for teachers, art schools, engineering institutions and theological schools.

New Zealand's Advancement. Mention has been made of governmental and economic measures which have marked the dominion's development. These have been due very largely to the demands of labor, and may be summarized as follows, the years named being the date of enactment:

- 1870—National ownership of railroads
- 1881—A land tax, which broke up many large estates
- 1892—Government purchase of large estates, which were leased in small parcels at nominal rental
- 1893—An income tax was adopted, women were given right to vote for members of General Assembly
- 1894—Compulsory arbitration of labor disputes
- 1898—Old-age pensions were provided
- 1899—A universal minimum wage law
- 1908—Property requirements for immigrants
- 1910—Compulsory military training for boys between the ages of twelve and eighteen.
- 1920—Soldiers settled on public land

Cities. The four largest cities in 1934 were Auckland, 221,300, Wellington, (the capital) 146,800, Christchurch, 131,000, and Dunedin, 88,500. New Zealand's total population, 1934, estimated, 1,476,000.

Government and History. New Zealand was first discovered by Tasman in 1642, but little was known of it until the visits of Cook in 1770 and 1777. The first permanent settlement was made by missionaries in 1815; in 1841 it was formally separated from New

South Wales and placed under its own independent governor, and in 1852 it received a constitution and a responsible colonial government. Troubles with the natives of North Island about land gave rise to frequent Maori wars, and as late as 1886 a disturbance about land arose. In 1865 the seat of government was removed from Auckland to Wellington. The movement toward state socialism became prominent in 1890, progress in this direction is outlined above.

On September 26, 1907, designation of the Colony of New Zealand was changed to the Dominion of New Zealand. In the South African War, New Zealand loyally supported Great Britain, and in 1914, after Great Britain had declared war against Germany, a New Zealand expeditionary force seized the German possessions in the Bismarck Archipelago. The dominion, without solicitation, furnished more than its quota of soldiers for the war, and provided a battleship, the *New Zealand*, which it presented to the mother country.

In 1926, at the Imperial Conference in London, New Zealand, with the other dominions and Great Britain, formed the British Commonwealth of Nations (which see). The dominion is linked with the Empire only by the firm bond of loyalty.

Related Articles	Consult the following
titles for additional information	
Apteryx	Dunedin
Auckland	Maoris
Christchurch	Single Tax
Cook, James	Wellington

NEY, nay, MICHEL, Duke of Elchingen, Prince of the Moskva (1769-1815), a marshal of France. He entered the military service in 1788 and was a member of a regiment of hussars when the French Revolution broke out. He rose by degrees to the rank of general of division and distinguished himself in the Rhine campaign. Appointed marshal of the Empire by Napoleon in 1805, he achieved a victory over the Austrians at Elchingen and took part in the battles of Jena, Eylau and Friedland. In the Russian campaign he conducted the rear guard in the disastrous retreat. In the campaign of 1813 his skill and courage decided the victory of Lutzen and were of the greatest service at Bautzen and Dresden. When Napoleon abdicated and the Bourbon dynasty was established, Ney took the oath of allegiance to the king and received a command, but when the emperor landed from Elba his old general joined him at Lyons.



Faing Calloway

THE MAORIS, FIRST TO PEOPLE NEW ZEALAND

Originally a savage tribe, now a civilized group. Upper left, Maori women touching foreheads, this is their customary salute. Upper right, a Maori chieftain, in native war decoration. Below, a native dance, men only participating.



NIAGARA FALLS
The American Falls in the foreground

and opened the way to Paris. When the allies entered Paris he escaped in disguise to the provinces, but was finally arrested, brought back to Paris, tried for treason and executed.

NEZ PERCE, *na pair say*, an Indian tribe who formerly lived in the eastern portions of Washington and Oregon and in Central Idaho. After giving up their lands and taking new ones, they became displeased at the inroads of the miners upon their new territory, and under Chief Joseph they began a war in which their masterly leader for a long time defeated the regular United States troops. In fact, Joseph finally surrendered only under a promise to be returned to his old reservation. The government proved false to its word, and the Indians were moved into the former Indian Territory. More than half their number quickly perished there by disease, and in 1884 they were returned to a reservation in Northern Washington.

About 2,000 of the tribe are now living in two reservations in Washington and Idaho. Their name, meaning *pierced nose*, was applied by the French to those tribes that were accustomed to piercing the nose, but this particular tribe did not apparently practice this custom.

NIAGARA FALLS, N. Y., in Niagara County, on Niagara River at the point of location of Niagara Falls (which see), one of the great scenic wonders of America. The city is twenty-three miles north of Buffalo, on the Michigan Central, the Lehigh Valley, the Erie, the West Shore, the Wabash and the New York Central railroads. There is also interurban connection with Buffalo and with Niagara Falls, Ontario. Three notable suspension bridges connect the city with the Canada shore. The state has made 412 acres adjoining the Falls into a state park, and there are two smaller parks.

The city is a mecca for sightseers, many thousands visiting the Falls every year. It also possesses unusual educational advantages in De Veaux College (Protestant Episcopal) and Niagara University (Roman Catholic). There are two hospitals, a Carnegie Library and a Federal building. Hotels of all classes provide amply for visitors.

Niagara Falls has become a great manufacturing center since the unlimited water power from the rapids in the river have been available by law for use. There is one of the greatest shredded-wheat factories in the

world, other industries include paper and flour mills, electric heaters, carborundum, graphite, carbide and carbon works, and electrochemical works. The city has been governed on the city manager plan. Population, 1920, 50,760, in 1930, 75,460.

NIAGARA FALLS, ONT., in Welland County, on the Niagara River, between Lake Erie and Lake Ontario, opposite Niagara Falls, N. Y. It was formerly called Chilton. Its geographical position makes it a great railroad center, practically all of the great trunk lines, including the Canadian Pacific, the Canadian National Railway, Michigan Central, Wabash, and Erie systems, have connections here. The great water power of the falls furnishes abundant power for many industrial establishments, the most important of these produce silverware, iron and steel, chemicals, leather and leather goods, neckwear, hosiery and hats, firearms, paper and paper boxes. The city has one of the finest park systems in the world, and it is the center of a boulevard system which extends from Lake Erie to Lake Ontario. Its location at the great Falls makes it a great resort for tourists all seasons of the year. Population, 1931, 19,046.

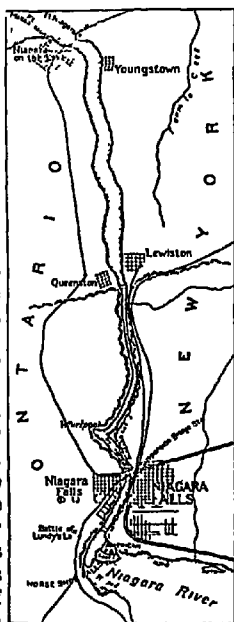
NIAGARA FALLS AND RIVER. The Falls of Niagara and several miles of the course of Niagara River constitute one of the scenic wonders of the world. The river connects Lake Erie with Lake Ontario and separates the state of New York from the province of Ontario. It is thirty-three miles long and has a fall of 331 feet between the two lakes. In the upper part of its course, for about sixteen miles, the stream flows through a broad plateau, with scarcely any valley. Near the lower edge of this plateau is Grand Island, whose area is 17,000 acres, separating the river into east and west branches. After the branches reunite, the river flows quietly for a short distance and has a channel between two and three miles wide, which contains a number of islands. It then narrows and make a rapid descent, forming the rapids over which the river falls fifty-two feet in a short distance. At the foot of the rapids are the Falls, which are divided by Goat Island into two cataracts, known as the Canadian, or Horseshoe, Falls, on the west, and the American Falls, on the east.

The cataract is caused by the river's falling over a ledge of hard limestone, which is underlaid by layers of softer rock. This ledge

outcrops a few miles south of Lake Ontario, and the Niagara Gorge, below the Falls, has been formed by the wearing away of this rock by the cataract during the thousands of years that the river has occupied its present channel. The tremendous velocity of the water as it approaches the edge of the Falls throws it out from the foot of the cliff to a distance of forty or fifty feet, it was even greater before so much water was withdrawn above the Falls for power for factories.

The lower strata of the rock under the Falls have been worn away more rapidly than the upper layer, over which the water is precipitated, thus forming a sort of cave, into which visitors can enter, both at the outer end of the Canadian Falls and near Goat Island on the American side. In each of these places paths have been excavated and platforms built, which enable sightseers to obtain a magnificent view of the Falls. The place of entrance near Goat Island on the American side is known as the Cave of the Winds. The Canadian Falls, which are by far the larger, have an extent, measured on the curve, of 2,950 feet, or on the chord of the circle, of 1,230 feet. Their height is 158 feet, and the depth of the water near the center of the fall exceeds twenty feet. The American Falls have a length of 1,010 feet and a height of 167 feet, but the volume of water is only one-twentieth of the total flow over the precipice. The Canadian Falls are therefore much greater, though of less vertical height. Over the precipice between 400,000 and 500,000 tons of water fall every minute, fed by the mighty reservoirs of the Great Lakes.

Below the Falls. Here the river flows through a gorge for about seven miles. For



a good portion of the way the gorge is deeper than the height of the falls, and its sides are nearly perpendicular, so that it can be ascended in only a few places. For a portion of its course through this gorge the water moves quietly but when it reaches a point about two miles below the Falls, it is precipitated over another series of ledges, forming the famous Whirlpool Rapids, which in many respects excel the Falls in grandeur. Here the turbulent waters race at a speed of thirty miles per hour. Below these rapids the river makes a sharp turn to the left, and the force of the current has worn in the rock a large circular basin, around which the tumbling waters continue to flow, striving to find an outlet in the channel below. This forms the Whirlpool, which is the greatest maelstrom in the world. Below the Whirlpool the slope in the gorge is more gentle, and the waters flow with continually decreasing velocity until they reach the Ontario plain, about seven miles from the mouth of the river.

The river and Falls furnish some of the grandest spectacles of natural scenery in the world, and are visited by thousands of tourists every year. In order that these places of interest could be visited without unnecessary expense and annoyance, the state of New York in 1885 secured control of the tract of land adjoining the Falls and established Niagara Falls Park, which includes Goat Island and other small islands adjacent to it. The year following, the Canadian government established Victoria Park, on the opposite side of the river. An electric railway extends down the gorge to near Lewiston, following the foot of the cliff, and crosses to the Canadian shore, which it follows back to the city. The lower suspension bridge now connects these lines, the visitor can make a circuit of the region, passing on one side on the top of the bluff and on the other at its foot, thus obtaining excellent views of all points of interest.

The Niagara gorge near the Falls is spanned by three bridges, the first is a steel arch bridge for carriages and electric cars, about one-eighth of a mile below the Falls, the second, the cantilever bridge of the Michigan Central Railway, about two miles below the Falls; and the third, the steel railroad bridge of the Canadian National Ry, which was erected to replace the old suspension bridge, the first large structure of its kind

erected in America (see BRIDGE, subhead *Suspension Bridges*)

The Whirlpool may be viewed in a thrilling but safe ride on an aerial cable railway, 1,800 feet long, built in 1916 on the Canadian shore. It is the only one of its kind in America. In the passenger car twenty-four people can be seated and twenty others may find standing room.

Harnessed for Industry The building of power houses and factories along the shores of Niagara River and Falls threatened for a time to destroy the grandeur of the view, by turning the main current from its natural channel, leading over the Falls, to underground sluiceways and tunnels, where it generated power. The amount of water thus used had already made an appreciable difference in the volume of the cataract, and plans were completed for large extensions of the plants, when by a joint effort of the governments of the United States and Canada in 1910 provision was made for restricting the amount of water used for industrial purposes. This amount is 20,000 cubic feet per second on the American side and 36,000 cubic feet on the Canadian side. Much of the power produced by this flow is converted into electrical energy by means of great turbine wheels, and the electricity is conveyed by wires to considerable distances. Buffalo's street cars are run by power thus received from the Falls, but about three-fourths of the 300,000-horse power generated is demanded in the two cities facing the cataract.

Welland Canal The commerce of the Great Lakes passes from Lake Erie to Lake Ontario through the Welland Canal, in Canada, constructed nearly parallel to the river. See WYLLAND CANAL.

NIBELUNGENLIED, *ne'be loong en leet*, one of the earliest and the greatest of national German epics, which, in some form or other, has existed from the thirteenth century. It is of unknown authorship and is, like most of the great national epics, rather a growth from separate ballad poems than a performance completed at any one period. It was originally founded on the story of Sigurd in the *Elder Edda*, and additions were made to it from time to time. The main story, with Norse foundation, is as follows.

Odin, Loki and Hörnir, to appease Rodmar, whose son they had killed, steal for him all Andvari's gold, including a magic ring. With the gold goes a curse, the leitmotif of the whole story. Rodmar, for the sake of his

gold, is murdered by his sons, Fafnir and Regin. Fafnir runs away with the entire treasure and, in the form of a dragon, watches over it. Regin, a smith, plots vengeance. Sigurd, son of a slain hero, Sigmund, comes to Regin to learn his craft. He hears of Fafnir, and determines to kill him. From fragments of a sword Odin had given his father, he wields a mighty weapon and slays the dragon. Burnt by a drop of the dragon's blood, he raises his burning finger to his lips, and instantly understands the language of birds, who tell him that Regin plans treachery. Sigurd slays Regin and with the treasure sets out. On a hill encircled by fire he finds Brunhild, sleeping. He awakens her with a kiss, and the two plight their troth.

Again Sigurd wanders. At the court of King Giuki the Queen gives him an enchanted drink and he forgets Brunhild. Gunnar wishing to marry Brunhild himself, enlists Sigurd's aid in the quest. In the general misunderstanding Sigurd marries Gudrun, Gunnar's sister, and Brunhild marries Gunnar. This perversion of affairs—the operation of the curse—ends in tragedy for everyone. Sigurd is murdered, and Brunhild slays herself upon the funeral pyre. The gold had been stolen by Gudrun's brothers and hidden in the Rhine and when they were treacherously murdered on account of it the secret of its whereabouts perished.

The story of the Nibelung treasure and its curse forms the basis of Wagner's trilogy *The Nibelung Ring*, though his music drama differs in many particulars from the original folktale, and into it is woven a beautiful symbolic and logical philosophy of life.

NICARAGUA, *nik a raw'gwah*, the second largest of the Central American republics, Guatemala being ninety square miles larger. It is almost exactly the size of the state of New York. The country would have attained worldwide importance had the Nicaragua Canal been built, but to-day it is of no more note than some of its neighbors. The area is 49,200 square miles, the population, in 1930, was estimated as 750,000.

The Country The extension of the Rocky Mountains of North America, called the Cordillera of Central America, extends through the republic nearly parallel to the Pacific Ocean, which borders the country on the west. Between the mountains and the ocean are depressions, one of which contains lakes Nicaragua and Managua. The mountain peaks reach an altitude in places of nearly 6,000 feet. East of the highlands the land slopes to the plains on the Caribbean shore, at the east, though mountain spurs of low altitude also extend eastward. Honduras is north, and Costa Rica is south.

Though close to the Pacific Ocean, the waters of the two large lakes above mentioned flow to the Caribbean Sea through the San Juan River, on the southern boundary, this stream is for the greater part of its course about one-third of a mile wide. The other rivers are for the most part short and unnavigable because of bars near their mouths. Bluefields, on the Caribbean, has direct steamship connection with New Orleans, 1,236 miles north. The Pacific port is San Juan del Sur, by steamer it is 2,700 miles from San Francisco, and 4,210 miles from Honolulu. The capital is Managua, on the lake of the same name.

The People The eastern coast is largely the Mosquito Territory, once an international issue, the home of the Mosquito Indians. In the eastern section are also the Zambo Indians and negroes from various West India islands, particularly Jamaica. This eastern part of the country is not adapted climatically to white men, except at Bluefields and a few other points along the coast.

In the western section there are about 17,000 white people of pure Spanish descent and many thousands of Indians. There is little communication between the east and the west. The Indians do all the work, and are obedient and industrious. Nearly all the people are Roman Catholics.

Resources The chief agricultural product is coffee, and most of the plantations belong to Americans and Germans. In the east bananas are a great source of wealth, and a million and a half bunches are shipped from Bluefields every year. Cotton, tobacco, rubber, corn, breadfruit, cocoanuts and rice are also grown. Thousands of square miles are densely forested. In the highland region cattle raising is profitable.

Government The republic is governed by a President and a Congress of two houses, elected every four years. Following armed clashes between the opposing parties, United States forces were asked to supervise a general election for President in 1928.

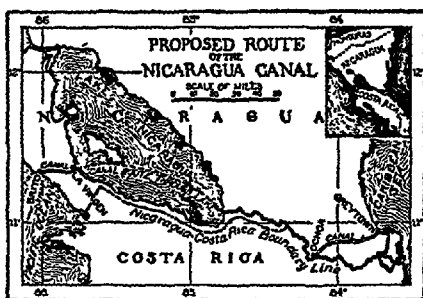
Related Articles. Consult the following titles for additional information:

Central America	Mosquito Territory
Leon	Nicaragua, Lake
Managua	Nicaragua Canal

NICARAGUA, LAKE, an extensive sheet of water in Central America, in the republic of Nicaragua, about 100 miles long from northwest to southeast, and about forty-five miles wide at its broadest point. It is about 110

feet above the Pacific Ocean, thirteen miles distant. The river San Juan flows from the southeastern extremity into the Caribbean Sea, and at its northwestern extremity the lake receives, through the Tipitapa River, the waters of Lake Managua. Lake Nicaragua contains several islands, the largest of which is Ometepe. For this proposed use of Lake Nicaragua, see **NICARAGUA CANAL**.

NICARAGUA CANAL, a canal projected across the Isthmus of Nicaragua, to connect the Atlantic and Pacific oceans. As originally surveyed, this canal was to extend from Greytown, on the Caribbean Sea, to Brito, on the Pacific Ocean. The length was 183.86 miles, of which 70.51 was to be through the San Juan River and Lake Nicaragua. In



1849 a concession for constructing a canal was granted a company headed by Cornelius Vanderbilt. However, nothing practical was accomplished for forty years.

In 1889 the Maritime Canal Commission was organized, and this was followed in 1899 by the Walker Commission, authorized by the United States Congress to report upon the practicability of the enterprise. This commission made a favorable report, and for a time it seemed probable that the canal would be constructed in accordance with its recommendation. However, before negotiations with Nicaragua were completed in 1902, the Panama Canal Company of France offered to sell its franchises and property to the United States for the valuation placed upon them by the canal commission. This offer was accepted, and interest was transferred to the Panama Canal (see **PANAMA CANAL**). In 1916 a treaty was concluded between the United States and Nicaragua by which the latter conceded to the United States the perpetual right to build a canal over any route in Nicaragua desired.

NICE, *nees*, (Italian, *Nizza*), FRANCE, one of the most attractive cities of the French Riviera, situated on the Mediterranean, near the base of the Alps, eighty-four miles north-east of Toulon. The city is the capital of the department of Alpes-Maritimes. Its location is beautiful, and as the climate is mild and invigorating, the city is very popular as a health resort during the winter. There are two divisions of the town, the old and the new, the latter made beautiful by many handsome squares and public buildings. The Casino, the cathedral, the theatres and the public library are among the most noteworthy buildings in the city. Nice possesses silk, cotton and paper mills, oil mills and manufactories of tobacco, leather, soap, wine and straw hats. It exports large quantities of fruits, perfumes and wines. Previous to 1860 this city belonged to Italy, but in that year it was ceded with other territory to France, as reward for aid rendered Italy in the war against Austria. Population, 1931, 219,549.

NICE, COUNCILS OF, ecclesiastical councils held at Nice, or Nicaea, in Asia Minor, in 325 and A. D. 786. The object of the first council, which was convened by Constantine, was to settle the controversies which had arisen in regard to the doctrine of the Trinity. The session lasted about two months. A creed was adopted which in its later form is known as the Nicene Creed. The council of 786, summoned by Empress Irene, with the concurrence of the pope, decreed that images were to be used as aids to devotion. See **ICONOCLASTS**.

NICENE, *nî'seen*, or *nî'seen'*, **CREED**, a summary of the chief tenets of Christian faith, adopted by the Council of Nicaea in A. D. 325. The Creed has a place in the liturgies of the Greek, Roman and Anglican churches and in most Protestant doctrine.

NICHOLAS I PAVLOVITCH, *nik'o las pahv'lo vich* (1796-1855), emperor of Russia, ascended the throne in 1825, on the death of his brother Alexander I. He made war on Persia; joined in the Treaty of London, which secured the independence of Greece, and took part with the allied powers in the destruction of the Turkish fleet at Navarino in 1827. This affair led to war between Russia and Turkey, in which the latter was defeated. Nicholas suppressed the Polish insurrection, which broke out in 1830, with relentless severity, and in 1848 he assisted Austria in

putting down the rising in Hungary. Early in 1852 began the Russian effort to take over the holy places and assume the protectorate of the Greek Church. This led to the Crimean War, before the close of which Nicholas died.

NICHOLAS II, *nik'o las*, (1868-1918), former czar of Russia, the last of the famous Romanoff dynasty. From his accession to the throne in 1894 until March 15, 1917, he was the revered "Little Father" to 180 millions of deeply religious Russians and the autocratic ruler of the largest empire in the world. On June 16, 1918, after the dynasty's fall and Russian chaos, a prisoner in the hands of the self-constituted Bolshevik government, he was cruelly shot to



NICHOLAS II

death. Such is the brief summary of the life of a weak, but well-disposed, unfortunate monarch. Had he been favored with other surroundings the whole course of events in Russia might have been changed.

As the eldest son of Czar Alexander III, Nicholas was proclaimed czarevitch (heir to the throne), at his birth. Wide travel supplemented his education, and in 1894, at the age of twenty-six, he became czar. In that year he married a German princess, Alexandra of Hesse, who always despised the Russians. Four daughters were born to the royal household before an heir to the throne was assured in 1904 in the birth of Alexis. (Under the Salic law no woman could rule the Russians.) The character of the reign of Alexander III was thoroughly autocratic. Nicholas had not the strength to maintain his father's iron autocracy or to adhere to a more liberal policy, towards which he showed occasional tendencies. His weakness frequently led him to concessions which later were arbitrarily withdrawn. Thus discontent throughout the empire continually increased.

In his foreign relations Nicholas was an advocate of peace. In 1899 he instituted the Peace Conference at The Hague, but was drawn into war with Japan in 1905, and because of his alliances was thrown into the

World War in 1914 at its inception. The part that Russia played in the first two years of that struggle was tremendous, it saved the allied cause. German intrigue at the Russian court and in the army, fostered by the czarina, who was wholly German in her sympathies, led to the demoralization of the czar's armies, treason in high places undermined the Russian structure, and the czar was reported to be considering a truce with Germany.

A climax was reached when a revolution, carefully planned, deposed Nicholas on March 15, 1917. He was held a prisoner in his palace, and with him, his family. When the second revolution occurred in November, the Bolshevik government sent him to Tobolsk, Siberia, then to Ekaterinburg, where the whole family was said to have endured great privation. For months their fate was unknown. Later it was authoritatively stated that Nicholas, the czarina, and their five children were put to death by the commissar at Ekaterinburg and his aids, on the urgent demand of the local communists.

Related Articles. Consult the following titles for additional information:

Bolshevik	Russia
Peace Conference	Social Law
International	World War

NICHOLAS, SAINT (?-about 326), a Roman Catholic saint whose name has come to be synonymous with **SANTA CLAUS**. In the fourth century, according to tradition, there lived a kindly Saint Nicholas who worked many miracles and was greatly beloved. From early times feasts were held in his honor in Europe, and in many places in Germany the sixth day of December, the day of his death, is still set apart as a sacred day. He is also the patron saint of the Russian Church. Inasmuch as his feast day was celebrated shortly before the Christmas season, he acquired a new character, that of the Santa Claus beloved by children. The name Santa Claus (or Klaus) is the Dutch corruption of his real name, and it is chiefly in his rôle of the children's friend that he is known among non-Catholics.

NICHOLSON, mī' tson, MEREDITH 1866-), an American writer, born at Crawfordsville, Indiana, and educated in the public schools of Indianapolis. Butler and Wabash Colleges conferred on him the honorary degree of A. M. (1901-1902), and the latter the degree of Litt. D. (1907). Mr. Nicholson is a member of the National In-

stitute of Arts and Letters. Since the publication of his first book, *Short Flights*, about thirty works have come from his pen. These include *The House of a Thousand Candles*, *The Port of Missing Men*, *The Siege of the Seven Sultans*, *The Valley of Democracy*, *Black Sheep! Black Sheep!*, *The Man in The Street*, *Broken Barriers*, *The Hope of Happiness*, and *They Lived Happily Ever Afterwards*.

NICIAS, nish' e as, an Athenian statesman and general, active during the Peloponnesian War. He was one of the leaders of the aristocratic party, and was the opponent, after the death of Pericles, of the demagogue Cleon. In the campaigns against the Spartans, he met with some successes, and in 421 he brought about a peace between Sparta and Athens, known as the Peace of Nicias. When, in 415, he was appointed one of the leaders in the expedition against Sicily, he used his influence to prevent the expedition, but in vain. His fleet suffered a defeat, and his troops, retreating across Sicily, were forced to surrender. Nicias himself was put to death by the Syracusans (413 B. C.).

NICK'EL, a metal of a whitish color, of great hardness, and when perfectly pure, malleable and ductile. It is about nine times heavier than water. It unites in alloys with gold, copper, tin and arsenic, which metals it renders brittle. With silver and iron, its alloys are ductile. Nickel is found in all meteoric stones, but the most important mines are at Sudbury, Ont., from which more than half the world's supply is obtained. Next to the Sudbury mines, the greatest production is in New Caledonia, but there were discovered in 1918 great deposits in the Celebes, which may in time rival the Sudbury district. Nickel, mixed with brass in varying proportions, is now well known and largely used as *German silver*, or *nickel silver*. One-fourth of the American 5-cent piece is nickel (the remainder being copper).

NICOBAR, nī' o bahr', ISLANDS, a group of nineteen islands in the Indian Ocean, at their nearest point 130 miles from Sumatra. With the Andaman Islands they form an extension of the chain which includes Sumatra and Java. Twelve are inhabited. The area of the group is 635 square miles. The soil is fertile, and cocoanuts, oranges, sugar and bamboo grow in abundance. The natives depend for their support largely on the trade in cocoanuts and copra.

The islands, together with the Andamans, constitute a British Indian province, and they are administered by a chief commissioner, with headquarters at Nancowry. Population, 10,000.

With the development of air travel, the Nicobar Islands are taking on a new significance, being on the direct trans-ocean air route between the Straits Settlements and Burma on one side and India and Ceylon on the other side of the Bay of Bengal, and forming a convenient refueling base.

NICOTINE, *ni'ô tén*, or *ni'ô tîn*, a transparent colorless, oily vegetable substance, one of the alkaloids, and a poison. A small quantity in a pure state has been known to cause death. It is found in the leaves, roots and seeds of tobacco, the quantity varying from two to seven per cent of the composition of the plant. Cuban (Havana) tobacco contains only 2 per cent, Connecticut, 0.35 per cent, Wisconsin, 0.33 per cent, Kentucky, 0.61 per cent, Virginia, 0.63 per cent. Turkish tobacco contains hardly a trace.

The smoking habit is condemned because of the presence of nicotine in tobacco. Smoking would be an exceedingly dangerous habit if indulged to excess, were it not for the fact that most of the nicotine, as it becomes heated, passes off in smoke. The boy who smokes for the first time may become very ill, his distress is due to the fact that his system is affected by the presence of a strange and active drug theretofore foreign to his experience. See ALKALOID, TOBACCO.

NIELSEN, *nel'sen*, ALICE (1876-), an American dramatic soprano. She was born at Nashville, Tenn., and studied music at San Francisco. In 1892 she was married to Benjamin Nentwig, and from 1893 to 1902 starred in comic opera. Subsequently she studied at Rome and afterwards appeared in grand opera at Milan, Naples and London. She toured the United States with the Don Pasquale and San Carlos opera companies, she was associated in 1910 and 1911 with the Boston Opera Company, and was later connected with the Metropolitan Opera Company of New York.

NIETZSCHE, *né'chêh*, FREDERICK (1844-1900), one of the most original and daring of German philosophic writers, was born at Rocken, Saxony, and educated at Bonn and Leipzig. From 1869 to 1879 he was a professor at Basel, and for the next ten years

devoted himself largely to writing, from 1889 until his death he was insane. Nietzsche has been held responsible by many for the war spirit in Germany, though he has perhaps had more English than German readers. He denounced religion, particularly Christianity, and taught that the end and aim of existence should be to produce a superior race—supermen—who should mercilessly dominate the earth. According to his system of eugenics, the strong should not waste their energies helping the weak, but should crush them out of the way. His most widely read books are *Thus Spake Zarathustra* and *Beyond Good and Evil*.

NIFLHEIM, *ni'fl'hm*, in Scandinavian mythology, the region of endless cold and everlasting night, ruled over by Hel. Besides the wicked, all those who died of sickness or of old age were cast into Niflheim, and as existence there, even for the good, was but a negative sort of happiness, many men and women preferred to put themselves to death rather than to meet the fate of one who died in his bed.

NIGER, *ni'gur*, or **JOLIBA**, *jo le'bah*, a great river of Western Africa, after the Nile and the Congo the largest on the continent. It rises only 150 miles from the sea, in the French Guinea and northeast Sierra Leone frontiers. It flows north and northeast, then, describing a great curve, turns near Timbuktu and flows southerly, entering the Gulf of Guinea through a great delta consisting of a network of channels and islands extending along the coast 150 miles. Locally it is known in its upper course as Joliba, in the middle as Issa, and Mayo, and as Kwara, or Quorra, near its mouth. Its total length is about 2,500 miles. At Sego, about 340 miles from its source, it enters upon a fertile tract of country, which continues until Timbuktu is reached. Here large islands divide the river channel, and its tendency is to spread over the flat country in a network of small streams. Below Timbuktu it narrows to a width of 300 feet, flows through a rocky gorge, then through a desert region, after which it enters a fertile and populous territory. The Nun is the only one of the mouths which is navigable for large vessels. It is comparatively free from rapids, and with its tributary, the Benue, furnishes access—and the only water access—to Central Africa. It is continuously navigable to Rabba, 460 miles from its mouth.

NIGERIA, *ni jé'ri-a*, a colony and protectorate of Great Britain, in West Africa. The former German colony of Kamerun is on the east, the Gulf of Guinea is south, and the French possession of French West Africa and Dahomey are north and west. The chief capital is Lagos (population 126,000), on the gulf coast, a northern administrative capital is at Kaduna, more than 400 miles up the Niger River.

Nigeria contains 372,650 square miles. The parent colony of Nigeria is small—1,400 square miles. The protectorate contains Northern Provinces (281,775 square miles) and the Southern Provinces (89,515 square miles).

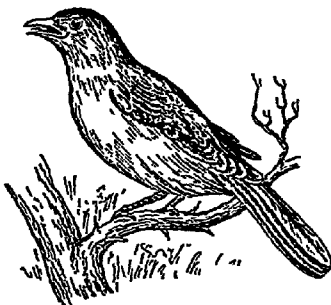
The population of all Nigeria is about 19,928,000, a few thousand are white. The natives raise corn, cotton, cacao and yams.

Slavery existed in the interior until British authority was asserted in 1900. The present government of the three divisions as a colony and two protectorates dates from 1914, though the coast section has been British since 1861, when it was purchased from a native king. Expansion and civilizing influences have been gradually extending inland.

NIGHT HAWK, in North America the name of a bird closely related to the whippoorwill (which see) and strongly resembling it in many ways. Unlike the whippoorwill, it has white wing markings, and prefers the open country to the woods. It has an exceedingly vigorous flight and takes its prey, consisting of beetles and other large insects, on the wing, usually in the evening. It may then be seen flying rapidly, making long descending swoops, with a hoarse whirring of its wings. The night hawk spends the day quietly sitting on the ground. Its eggs, two in number, are laid on the bare ground, with no attempt at protecting them by a nest.

NIGHT HERON, a small, restless bird, resembling the heron and intermediate between it and the bittern. The birds of one American species are about two feet long, have soft ash-gray plumage above, white below, and black markings on neck and head. The head is adorned with three long white feathers. The birds have a hoarse cry and feed, usually at twilight, on aquatic animals. They nest in colonies, in trees, and return to the same places year after year from their migration.

NIGHTINGALE, a well-known bird of the thrush family, found in Europe, and everywhere famous for the exquisite night song of the male. It is a little brown



NIGHTINGALE

creature, not much larger than the American bluebird, and is modestly clad in a coat of russet-brown. On the moonlight nights the male often sings in woods and shrubbery till long after midnight, but in the daytime it is shy and rarely seen or heard. The bird is referred to in the poetry of all countries and is spoken of by its classical name, philomel, or its Eastern name, bulbul. The name Virginia nightingale is sometimes given the cardinal bird (which see).

NIGHTINGALE, FLORENCE (1820-1910), an English philanthropist, born in Florence, Italy. At an early age she became interested in hospital work, visited the chief military hospitals of Europe and studied nursing in Germany and in France. During the Crimean War hospital accommodations were found to be very defective, and Miss Nightingale promptly volunteered to organize a band of nurses. The offer was accepted by the English government, and within a week she was on her way to Scutari, where she rendered invaluable service to the sick. Later she labored for hospital reform and during the Civil War in America and the Franco-German War she was able to give advice of inestimable benefit. Her *Notes on Hospitals*, *Notes on Nursing*, *Notes on the Sanitary State of the Army in India* and

FLORENCE
NIGHTINGALE

Life or Death in India gave a tremendous stimulus to the subject of nursing in England

NIGHTJAR See GOATSUCKER.

NIGHTMARE, a state of oppression, or a feeling of suffocation, which sometimes comes on during sleep, and is accompanied by intense anxiety, fear or horror. The sufferer may feel an enormous weight on his chest and dream that he is pursued by a phantom or wild beast or that he is threatened by some other danger, from which he can make no motion to escape. After a short time he awakens in a state of great terror, often with his body dripping with perspiration. It is supposed that the immediate cause of nightmare is some irregularity in the circulation of the blood in the chest or brain, caused by indigestion or by a strained or unnatural position of the body. Those subject to nightmare should not eat heavily before retiring, and should cultivate poise and mental tranquillity.

NIGHT SCHOOLS. See EVENING SCHOOLS.

NIGHT SHADE, a plant belonging to the genus known to botanists as *Solanum*, and found in all continents. The plants have slightly narcotic properties, and some are poisonous. One species is the beautiful bittersweet, a woody vine with flowers resembling potato blossoms and having clusters of tomato-red berries, another is the black nightshade, having white, bell-shaped flowers and black berries, still another is the deadly nightshade, or belladonna, which has black berries the size of cherries, and is poisonous. This last yields a valuable drug, for which it is widely cultivated in parts of Europe. See BELLADONNA.

NIHILISTS, the name at first applied specifically to the revolutionary party in Russia which accepted anarchism (see ANARCHISTS), but later applied indiscriminately to Russian revolutionists. This name was first given to the party about 1860 by Turgeneff in his stories of Russian society. Their object was to destroy all forms of government, overturn all institutions, annihilate all class distinctions and sweep away all traditions. For some years this propaganda was spread in printed and oral forms among the serfs by thousands of young people of both sexes. About 1874, however, the Russian government began to interfere, the newspapers which advocated the Nihilist doctrine were

suppressed, and large groups of the revolutionists were summarily tried and condemned to death or exile. Thereafter the Nihilists adopted a secret and bloody program, and they were responsible for many outrages, including the murder of Czar Alexander II. The revolutionary teachings of the Nihilists were taken up by the radical Socialists, and after the downfall of the czarist régime, in 1917, the government passed into the control of the group of Socialists known as Bolsheviks. See RUSSIA.

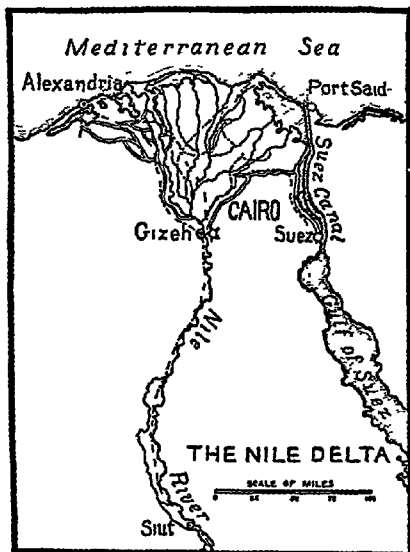
NIJNI-NOVGOROD, *nyeezh'nye novgorod* See NIZHNI-NOVGOROD.

NIKE APTEROS, or **ATHENE NIKE**, TEMPLE OF, a beautiful temple of the Doric order, which stood on the site of the entrance to the Acropolis at Athens, built in the Age of Pericles and consecrated to Athene. It was eighteen by twenty-seven feet and had four Ionic columns, thirteen and one-half feet in height, at each end. The frieze contained sculptures representing historical and mythological scenes. The building was torn down by the Turks in the last part of the seventeenth century, but in 1835 it was rebuilt.

NILE, a great river of Africa, which, in its course through Egypt, annually overflows its banks and transforms a barren region into a land of flourishing crops. Next to the Mississippi-Missouri system the Nile is the longest river in the world, being nearly 4,000 miles in length.

Its Course. The main stream, or White Nile, has its source in the equatorial lake, Victoria Nyanza. What is known as the Blue Nile, a much smaller stream, joins the White Nile at Khartum. Near where it flows out of Lake Victoria, the river forms the unimportant Ripon Falls, then flows generally northwest and afterward forms the Falls of Karuma and the Murchison Falls. Then, after a further course of thirty miles, it enters another lake, the Albert Nyanza, at an elevation of about 2,300 feet. From the Albert Nyanza to the Mediterranean the general course of the Nile is in a northerly direction, with numerous windings. Above Gondokoro the river forms a series of cataracts, but between these falls and the Albert Nyanza, a distance of over 150 miles, it is broad, deep and navigable. Not far below Gondokoro it begins to flow more to the west, until it reaches Lake No, where it receives the Bahr-el-Ghazal.

On receiving this affluent the river turns due east for about 100 miles, and then, after receiving the Sobat from the southeast, it flows almost due north to Khartum. It receives the important Blue Nile from



the Ethiopian Lake Tana. Between here and the frontiers of Egypt occur several rapids or cataracts, presenting greater or lesser obstacles to navigation. In Egypt, at the head of the Delta, near Cairo, the river divides into two main branches, leading down respectively to Rosetta and Damietta, where they enter the Mediterranean.

At Flood Time. As rain scarcely ever falls in the greater part of the valley of the Nile, the river owes its supplies to the copious rains and the vast lake areas of the tropical regions in which it takes its rise, and its volume thus depends upon the season. It begins to increase in June, attains its greatest height about September and then subsides as gradually as it rose. The ordinary rise at Cairo is about forty feet. During the flood a great portion of the delta and of the valley of Egypt is inundated. This annual inundation, with all the rich soil which it brings, is the chief reason for the fertility of Egypt, and no doubt it was for this reason that the Nile was worshiped as a god, alike by Egyptians, Greeks and Romans. Near Assuan, just below the first cataract, the

British government has built a great dam to store water for irrigation.

The dotted lines in the accompanying map indicate the route of the Cape-to-Cairo railway and its connections.

Related Articles. Consult the following titles for additional information:

Assuan	Egypt
Cape-to-Cairo	Irrigation
Railway	

NILSSON, *ni'sun*, **CHRISTINE** (1843-1921), an operatic star very popular with audiences of the latter part of the nineteenth century. She was born in Sweden, where, through the help of a wealthy man who became interested in her, she received a good musical education. In 1860 she made her professional debut in opera in the city of Stockholm, appearing four years later in Paris in the rôle of Violetta (*Traviata*). Her career thereafter was a succession of triumphs, both in Europe and the United States. Her voice was remarkably clear, sweet and sympathetic, though less powerful than that of Patti or Melba. Miss Nilsson retired permanently from the stage at the age of forty-four.

NIMBUS a term applied in art, especially in sacred art, to a halo surrounding the head, in representations of divine or saintly subjects. It was first used in Christian art in the fifth century, and took various forms. The nimbus in representations of God the Father is triangular and has rays extending in all directions, the nimbus in representations of Christ contains a cross more or less enriched, that of the Virgin Mary consists of a circlet of small stars, and that of angels and saints, of a circle of small rays. When the nimbus is of a square form it indicates that the person was alive at the time of delineation.

NIMES, or **NISMES**, *neem*, FRANCE, an important manufacturing city, capital of the department of Gard, 174 miles southwest of Lyons. It has an ancient cathedral, an old citadel and a number of striking public buildings. It is chiefly noted, however, for its Roman antiquities, which include a temple ornamented with Corinthian columns, a huge amphitheater and the famous aqueduct, Pont du Gard, fourteen miles distant. A picture of this aqueduct accompanies the article **AQUEDUCT**.

Nîmes is the great center of Southern France for trade in silks. The city is supposed to have been founded by a Greek colony, and was for about 500 years in the

possession of the Romans, under whom it attained considerable importance. In the sixteenth century it became a stronghold of Calvinism and it suffered much during the civil wars. It was the birthplace of the novelist Alphonse Daudet. Population, 1931, 89,215.

NIMROD, a Bible character described in *Genesis* X, 8-12, as a descendant of Ham, a son of of Cush, a mighty hunter before the Lord. He is the traditional founder of Nineveh and other ancient cities. His name is to-day used as a symbol for anyone who is fond of hunting.

NINEVEH, a dead city of Iraq, at one time capital of the Assyrian Empire. It was situated on the east bank of the Tigris, near the site of the present city of Mosul. Although the town itself covered an area only three miles long and one mile wide, the capital embraced a much more extensive area and included four near-by towns or suburbs. Nineveh was the capital of Assyria from about 1300 to about 606 B C; in the latter year it was destroyed by a confederation of Medes, Persians and Babylonians. In 1842 Boita, French consul at Mosul, began to excavate the vast mounds on the banks of the Tigris and discovered the buried ruins. He was followed in the work of investigation by Layard and investigators of the British Museum. Vast palaces, a royal library, sculptures and innumerable small objects of every kind were uncovered, and the walls of the city with their elaborate outworks, moats and defenses were traced. Many of the movable relics were deposited in the British Museum. See **ASSYRIA**.

NING-PO', **CHINA**, a city in the province of Che-kiang, one of the ports open to foreign commerce. It is on the Ning-po River, about sixteen miles from the sea. It is surrounded by a wall twenty-five feet high, and its most remarkable edifice is the great Ning-po pagoda, now partly in ruins. The manufactures consist chiefly of silk and cotton goods, carpets, furniture, gold and silver wares and confections. The principal exports are tea, silk and raw cotton. The city is a center of education, having several colleges and a great library. It is also a center of missionary effort. Population of district, 680,000; of the city proper, 218,775 (1931).

NIOBE, *ní'ó be*, in Greek mythology the daughter of Tantalus, the wife of Amphion, king of Thebes. Proud of her twelve children, she boasted of them to Leto, who had

but two, Apollo and Artemis. Those deities, in anger and jealousy, put her children to death. Their bodies lay unburied for nine days and then Zeus changed them to stones.

NIOBE in her grief, prayed to the gods, who, in pity, changed her into a rock image, in which form she continued to shed tears. The story of Niobe has been a favorite subject in literature and art. It appears, with divergencies in detail, in Sophocles, Aeschylus and Ovid, it has been represented on Greek vases, reliefs and in sculptured groups.



NIOBE

See **JAPAN**.

NIPIGON, or **NEPIGON**, a lake of Canada, in Ontario, about thirty miles northwest of Lake Superior, with 813 feet greater altitude. Its greatest length is seventy miles, and its width, about forty miles. It has rugged headlands, deep bays and many islands. The Nipigon River connects it with Lake Superior. The district is much frequented by sportsmen, for the fishing is excellent.

NIPISSING, or **NEPISSING**, a lake of Canada, in Ontario, northeast of Lake Huron, with very irregular coast line. Its length is about fifty-five miles, its greatest breadth, twenty-eight miles. It contains numerous islands, and finds its only outlet by French River into Georgian Bay. This lake provides excellent fishing.

NIPON, the former name of Japan.

See **BUDHISM**.

NIRVANA, *neer vah'na*. See **BUDHISM**.

NISAN, a month of the Jewish calendar, the first month of the ecclesiastical year and the seventh of the civil year, corresponding nearly to our March. It was originally called *Abib*, but the name was changed after the Babylonian captivity.

NISH, an important city in Eastern Yugoslavia, formerly in Serbia, the temporary seat of the Serbian government during part of the World War. It is situated on the Nishava River, about 130 miles southeast of Belgrade, at the junction of several railway

lines and highways, and is widely known as a prosperous trading center. Though partly Turkish, it has much the appearance of a typical European city. Nish was anciently a prominent city of the Romans, and was the birthplace of Constantine the Great. It fell to the Turks in 1456, and was occupied by Serbs in 1878. Gallic settlement, then a Roman town called Naissus, prominently mentioned by Ptolemy. Near its old walls Emperor Claudius destroyed a Gallic army, here in A. D. 274. Constantine the Great was born. Under the former Serbian government it was the custom that the king and parliament should live in Nish for three months of each year. Population, 1931, 35,500.

NITRATE, a general term for any salt of nitric acid. The nitrates have many practical uses. Lunar caustic, a compound of the nitrates of silver and potassium, is extensively used in surgery. The nitrates of lead and of iron are used in medicine, and the nitrates of barium and strontium are employed in the manufacture of fireworks.

As fertilizers, nitrates are of great value. Deposits of nitrates are present in small quantities in almost all soils, and enormous accumulations of nitrate of soda exist in Chile and Peru. These latter deposits, which are known as Chile saltpetre, or cubic nitre, are found near the coast and have been produced from remains of marine animals and birds. Chile saltpetre is one of the most important fertilizers known (see **FERTILIZERS**), and the Chile beds have long been the chief source of supply for American farmers. The United States government recently erected a plant at Muscle Shoals, Ala., to extract nitrogen from the air, to be used in the manufacture of nitrate for fertilizing and other purposes.

NITRE, *nî'tur*. See **SALTPETRE**.

NITRIC ACID, an important and powerful compound, formed of hydrogen, oxygen and nitrogen. When pure, it is a colorless liquid, very strong and disagreeable to the smell and so acid that it cannot be safely tasted unless much diluted. It does not occur in a free state in nature. It is produced through the action of strong sulphuric acid on the nitrate of sodium or potassium. It is known in the arts as *aqua fortis*.

Nitric acid contains about seventy-six per cent of oxygen and acts as a powerful oxidizer. Copper, tin and silver, when brought into contact with this acid, produce oxides

of nitrogen and metallic salt. When moderately diluted it produces a series of useful substances, notably, acetic, oxalic and picric acids and isatin, or white indigo. By replacement of the hydrogen in nitric acid, a series of salts termed *nitrates* is obtained.

Nitric acid is employed in etching on steel or copper, as a solvent of tin, to form with that metal a mordant for fine dyes, in metallurgy and assaying, in medicine as a tonic and as a substitute for mercurial preparations, in the form of vapor, to prevent contagion.

NITROGEN, a gaseous chemical element which constitutes about four-fifths of the atmosphere. In a free state it occurs in some nebulae, in some mineral waters and in soils. It is an essential constituent of various animal and vegetable tissues. Nitrogen gas was first isolated in 1772 and was found to be a colorless, odorless and tasteless gas. It combines directly with other elements—lithium, calcium and magnesium, with difficulty—though indirectly it produces many combinations. In combination with oxygen it forms nitric oxide and nitrous oxide (also called laughing gas), nitrogen peroxide and two other compounds of less importance. It is a very inert gas, and will neither burn nor support combustion. The greatest usefulness of nitrogen compounds is in contributing to the support of plant life. It is this element chiefly, drawn from the soil by living plants, that manures are put on to replace.

NITROGLYCERINE, *nî'tro glis'ur in*, an explosive substance, appearing as a colorless or yellowish, oily liquid, heavier than water. It is insoluble in water, but dissolves in alcohol or ether. It is prepared by adding glycerine to a cooled mixture of sulphuric acid and fuming nitric acid. The liquid is poured into ten or twenty times its bulk of cold water, when the heavy nitroglycerine sinks to the bottom. When violently struck, nitroglycerine explodes. The volume of gas produced is about 10,000 times the initial volume of the nitroglycerine. The explosive force of nitroglycerine compared with that of an equal volume of gunpowder is as thirteen to one; it is one of the strongest explosives known. If any traces of acid are allowed to remain in nitroglycerine, it is liable to undergo spontaneous explosion, hence, it is an exceedingly dangerous article to transport or store, and it is advisable to prepare the substance on the spot where it is to be used, and only in such

quantities as may be required for immediate consumption This method is adopted in many quarries and engineering undertakings Nitroglycerine has for some time been extensively used in the manufacture of dynamite and smokeless powder

Related Articles Consult the following titles for additional information

Blasting	Explosives
Dynamite	Smokeless Powder

NITROUS ACID See **NITROGEN**

NITROUS OXIDE See **LAUGHING GAS**

NIX, in German mythology, the name given to water spirits, male or female The male nix is sometimes represented as old, sometimes as young, but usually as a malicious being The female nixie appears as a maiden, who often falls in love with some young man, whom she entices or draws into the water

NIZHNI-NOVGOROD, *nyeezh' nye nov' go rod*, (renamed **GORKY**), **RUSSIA**, capital of the government of the same name, is situated at the confluence of the Volga and Oka rivers, 265 miles east of Moscow Previous to the revolution of 1917 the city was noted especially for the great annual fair held there late in the summer It was instituted in 1817, and for a century each fair attracted 500,000 dealers and visitors After the downfall of the Kerensky government the city was the scene of Bolshevik disturbances Nizhni-Novgorod is divided into three parts, the upper district, including the citadel, the governor's palace, libraries, schools, the cathedral and public buildings, the lower portion, containing the industrial establishments, and the suburbs Population, 1930, 350,000

NO'AH, one of the patriarchs of the Old Testament, son of Lamech, described in the book of *Genesis* as being chosen by God for his piety to be the father of the new race which should people the earth after the deluge Having been warned by God of the coming flood, he built a vessel (the ark) according to God's direction, and entered it with his family and animals of every kind After the waters had subsided the Ark rested on Mount Ararat, where Noah gave a thank offering to God and was assured that earth should never again be destroyed by a flood As a sign of his promise, God set the rainbow in the clouds Noah, or the family he represented, lived 350 years after the flood While modern accounts place Mount Ararat in Armenia, older traditions locate it in the mountains of the Kurds, east of the Tigris

NOBEL PRIZES, a series of prizes founded by Alfred Bernard Nobel (1833-1896), a Swedish inventor widely known for his invention of dynamite Mr Nobel bequeathed \$9,000,000, the income from which is annually distributed in five prizes awarded for the greatest contributions toward world progress and human welfare in physics, chemistry, medicine, literature and world peace.

The value of the prizes has varied from \$35,000 to \$46,000, each Awards are made by the Nobel Foundation and Institutes, the Royal Academy of Sciences in physics and chemistry, the Caroline Institute in medicine, and the Swedish Academy in literature The peace awards are made by the Norwegian Storting (Parliament)

The Peace Prize has been awarded to several Americans Theodore Roosevelt (1906), Elihu Root (1912), Woodrow Wilson (1919), Charles G Dawes (1925), Frank B Kellogg (1929), and Nicholas Murray Butler and Jane Addams (1931) In 1930 Sinclair Lewis received the Literature Prize Other awards have been A A Michelson, physics (1907), Alexis Carrel, medicine (1912), R A Millikan, physics (1923), A H Compton, physics (1927) K Landsteiner, medicine (1930), I Langmuir, chemistry (1932), H C Urey, chemistry (1934), Drs Minot, Murphy and Whipple, medicine (1934)

NOBILITY, a class of people possessing high privileges of a social nature, by government favor and hereditary transmission, not enjoyed by the masses Less frequently political favor accompanies a title of nobility Classes of nobility in Europe rose in the infancy of the nations and they still exist in a number of them They are found generally in monarchical governments

Among the ancient German tribes there were only obscure traces of hereditary nobility The dignities of the counts of the Franks, the aldermen and great *thanes* of England, as also the *jarls* (in England, *eorlas*) of Denmark, were accessible to every one distinguished by merit and favored by fortune In Venice a nobility grew up consisting of a series of families who gradually acquired all political power

In England hereditary nobility, that belonging to the titles of duke, marquis, earl, viscount and baron, is now entirely personal and social, though formerly it was connected with the holding of lands In Spain and Italy still, the same rank depends in great

measure upon property qualifications France under the empire fostered titles of nobility, the old families still retain the titles, as witnessed by the prefix *de*, but there is now no government recognition. Before the World War *von* and *com* indicated noble rank in Germany, with the passing of the royal Hohenzollerns princely titles became honors.

In the United States class distinctions were guarded against by the following paragraph in the Constitution (Art I, Sec 9).

No title of nobility shall be granted by the United States, and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state.

Related Articles. Consult the following titles for additional information

Baron	Earl
Count and Countess	Marquis
Duke and Duchess	Prince

NOCTURNE, *nok'turn*, a French term meaning *night piece*, applied to any musical composition which expresses a mood inspired by the soft, dreamy, quiet atmosphere of night. Chopin was the greatest master of this style of composition. A picture, such as Whistler's, representing the Thames in darkness, in which is poetically conveyed a sense of the mystery and beauty of night, is fittingly named nocturne.

NODE, an astronomical term used in connection with planetary orbits. All the planets of the solar system revolve round the sun in tracks or orbits slightly elliptical. The plane of the earth's orbit is called the ecliptic. The orbits of all the planets are not in exactly the same plane, that is to say, the plane of each orbit is slightly inclined to the ecliptic. Therefore each planetary orbit intersects the ecliptic at two points, opposite each other in the celestial sphere. The points of intersection are called *nodes*. The node which a planet reaches in passing from the south to the north side of the ecliptic is called the *ascending node*, the other is the *descending node*.

NOGI, *no'ge*, КИ-ТЭУ, General Baron (1851-1912), a Japanese general and administrator, famous for his successful siege of Port Arthur during the Russo-Japanese War, extending from May, 1904, to January 1, 1905. He was a member of the famous Samurai caste of feudal Japan, and after the reorganization of the country he entered the army and won distinction in the Satsuma

Rebellion, in which he was twice seriously wounded. After the Japanese-Chinese War of 1895 he was made governor of the island of Formosa, which was ceded by China to Japan as a result of that struggle, and showed remarkable ability as an administrator. At the outbreak of the Russo-Japanese War he was placed in command of the third army and was assigned the task of reducing Port Arthur, considered one of the most strongly fortified ports in the world. After the fall of that fortress he joined Oyama's force and took a conspicuous part in the great Battle of Mukden. In 1912 he and his wife committed *hara-kiri* because they did not wish to survive their beloved Emperor Mutsuhito. See HARA-KIRI.

NOMAD LIFE, that mode of living practiced by tribes who wander about from place to place instead of occupying any one home permanently. *Nomadism* is from the Latin for *roaming*. Those tribes of Central Asia who live chiefly by raising goats, cattle and other domestic animals practice nomadism because they must at intervals seek fresh pasturage areas. Such tribes live in tents and their mode of life is very simple. In North America there were still a few Indian tribes that wandered about the West and led nomadic lives, until late in the nineteenth century. The Hebrews of the time of Abraham and later were nomads.

NOME, *nohm*, ALASKA, on Seward Peninsula, which is a western projection of the territory. The town is about 150 miles southeast of the Alaskan point nearest the Siberian coast, across Bering Strait, and it is the largest settlement in its part of the country. It is the center of a productive gold-mining district, whose output once reached \$7,500,000 a year, but is now about \$1,500,000.

The permanent growth of the town dates from 1899. It now has every public service that is at the command of cities in the states. A railroad extends northwest to Shelton. Nome is the center of the educational and commercial activities of Western Alaska. Population, 1930, 1,213, in the boom days of the gold rush 12,000 people lived here.

NON-COMMISSIONED OFFICER, a soldier who holds the rank of corporal or sergeant. He is above the private and below the second lieutenant. The latter is the lowest commissioned officer. Non-commissioned officers are appointed by the superior officers of the company, battalion or regiment.

There are corporals and sergeants in every department of an army, their pay is about one-half more than that of privates See **CORPORAL, SERGEANT**

NONCONFORMISTS, those who refuse to conform to an established church The name was first applied to those English clergymen who, at the Restoration, refused to subscribe to the Act of Uniformity and were in consequence ejected from their livings Relief was afforded by the Toleration Act of 1689. The repeal of the Corporation and Test acts in 1828 removed the civil disabilities under which Nonconformists had previously been placed

NONES, *nōnz*, in the Roman calendar, the fifth day of the months January, February, April, June, August, September, November and December, and the seventh day of March, May, July and October The nones were so called from their falling on the *ninth* day before the ides

NON-INTERCOURSE ACT. See **EMBARGO**

NONPARTISAN LEAGUE, an organization of farmers and city workers, was organized in North Dakota in 1915 Although not a political party its purpose was political and social reform by control of an existing political party The Farm-Labor Party in Minnesota was an outgrowth of the Nonpartisan League organization in that State

In North Dakota, the program included a State-owned terminal grain elevator and flour mill, a state-owned bank, state hail insurance, state insurance of public buildings, and state bonding of public officials, all of which are in active operation at the present time

The elections of 1916 and 1918 gave the Nonpartisan League control of the state administration including both branches of the state legislature, and the 1919 legislative session made provision for carrying out the League program

The Bank of North Dakota was opened in 1919, and a state-owned mill and elevator were built and began operation in 1922

There was much opposition to the Nonpartisan League and its program and a recall of three state officials, constituting the Industrial Commission having control of the state industries, was instituted in 1921 and the opposition took control in November of that year The League did not get full control again until after the election of 1932

NORDAU, *nor'dow*, MAX SIMON (1849-

1923), a writer of Hungarian birth and a leader of the Zionist movement in Europe He studied medicine at Budapest and practiced there a short time, then went to Paris His writings are, in the main, bold attacks on the ethics of modern civilization Many of his books, written in French or German, have been translated, notably *Conventional Lies of Our Civilization*, *Paradoxes*, *The Malady of the Century*, *The Comedy of Sentiment* and *The Interpretation of History* The one upon which his fame rests is known to English readers as *Degeneration* In this he endeavors to prove that the intellectual activity and excitement of the last half century have resulted in the degeneration of once healthy mental condition into emotional sentimentality and impurity.

NORDIOA, *nawr'di ka*, **LILLIAN** (1859-1914), an American prima donna, whose real name was LILLIAN NORTON She was born in Farmington, Maine, received her first musical training at the Boston Conservatory of Music, and later studied in Italy and London She made her debut at Brescia in 1876, and first appeared in America in 1895 Her fine stage presence, dramatic power and supreme command of some of the greatest Wagner rôles gave her rank as one of the foremost sopranos who ever lived

NORFOLK, *nor'fawk*, VA, the second city in the state in size (Richmond being larger) and an important ocean steamship and railroad terminal and resort center, with Ocean View and Virginia Beach as the principal shore resorts It is situated near the mouth of the Elizabeth River at the broad estuary of the James River It is served by the Chesapeake & Ohio, the Norfolk & Western, the Norfolk Southern, the Virginian, the Southern, the Pennsylvania, the Atlantic Coast Line and the Seaboard Air Line railroads There are also two electric lines and five bus lines The harbor is large enough to shelter all of the navies of the world Some 50 steamship lines, with 8,000 vessels entering and leaving port annually, are in operation There are three airports besides the Hampton Roads Navy Air Station, nine miles to the north

The trade is principally in lumber, coal, grain, cotton, peanuts, oysters, soy beans, vegetables and fruit The total annual value of exports is about \$55,000,000 Norfolk is the fourth cotton port in the United States and with Suffolk leads as the peanut market

of the world. It has one of the largest coal-mining stations and is a very important navy base. The most prominent industrial establishments are cotton-knitting mills, cotton compresses, fertilizer factories, shipyards, tobacco and cigar factories, foundries, machine shops, lumber mills, automobile assembling plants and silk mills. The 11 parks cover 302 acres. The city has 37 schools, attended by 26,000 pupils, besides the Norfolk Academy and branch colleges of William and Mary and of the Virginia Polytechnic Institute. Portsmouth (across the Elizabeth River) and Norfolk constitute a Federal customs district. Old Point Comfort is just north of the city, and the Norfolk Navy Yard is in Portsmouth where \$50,000,000 have been spent in equipping it.

Norfolk was organized as a town in 1682, was incorporated as a borough in 1736 and was chartered as a city in 1845. In January 1776, about nine-tenths of the town was burned by the British under the Earl of Dunmore. The city suffered severely from yellow fever in 1855. It was entered by Virginia troops in command of William B. Tallaferro, in April, 1861, and the navy yard was fired, but little damage was done. Until taken by the Federal forces, in May, 1862, it was the chief naval station of the Confederacy. Population, 1920, 115,777, in 1930, 129,710.

NORMAL SCHOOLS AND TEACHERS COLLEGES, institutions for the training of teachers. A school man of national authority has said: "Teacher training consists in the provision of opportunities for prospective teachers to acquire the requisite body of knowledge, the professional attitude, the teaching skills, and the capabilities for future growth which are demanded by the special requirements of the position to be filled."

To accomplish these purposes over 330 normal schools and teachers colleges in the United States are training nearly 3,000 students. The normal school more often specializes in elementary teaching, while the teachers college often concentrates on high school teaching.

The first public normal was opened at Lexington, Mass., in 1839, the first one west of the Allegheny Mountains was established at Ypsilanti, Mich., in 1850. At least one state normal school is now maintained in every commonwealth of the Union, and states as populous as New York and Pennsylvania

have from six to ten, or more. These institutions are supported by appropriations made by the state legislature.

The professional subjects most frequently making up the training course are educational psychology, special methods, practice teaching and observation, tests, measurements and statistics, history of education, administration and supervision, secondary education, general methods—according to reports from 60 training institutions.

Professional training for the teacher may be gained in the special high school course, the county normal school, the state normal school, the state teachers college, the department of education in a college or the college of education in a university.

The amount of training required is affected by the supply of available teachers, but most states and private educational boards also are continually raising the standards for teachers.

NORMAN ARCHITECTURE, a modification of the Romanesque style developed by the Northmen and their descendants in France, England and Italy, where it prevailed until the twelfth century. When Edward the Confessor entered England to succeed the Danish king, Norman influence in architecture went with him. It was vastly increased after the conquest of England by William of Normandy in 1066. In the earlier French forms the Normans increased the size of the churches, preserving the basic Romanesque features, but introducing a Gothic element. The church plan is that of the Latin cross with the nave and aisles, one on each side, the transept is the short arm of the cross, the semicircular apse is at the east end of the nave (the choir). The nave is three stories high and rests on heavy pillars or clusters of pillars. The walls are very thick so that the doors are recessed deeply and are often decorated with sculpture. The cuttings on the stone are shallow. The buildings always preserve the massiveness of the typical Romanesque. The large square towers at the west end of the nave are stressed in each case and are heavily ornamented. The windows are small and narrow usually and over the windows and doors are semicircular arched heads. Single pillars support the arches generally over the building, but in the later patterns shafted pillars were employed. The masonry is not dressed but left rough, the joints are large. Richly carved moldings and fine mosaics are characteristic features.

The nave is high vaulted, that is, without ceiling

NORMAN CONQUEST See **WILLIAM I**, of England

NORMANDY, an ancient province in the north of France, now divided into the departments of Seine-Inférieure, Eure, Calvados, Manche and Orne. On the decline of the Roman Empire this territory was seized by the Franks, and afterwards, in the tenth century, it was wrested from them by the Northmen, or Normans, from whom it received its name. Charles the Simple gave his sanction to the conquest made by the Normans, and Rollo, their chief, received the title of duke of Normandy. William II, duke of Normandy, in 1066 became king of England (see **WILLIAM I**, of England), and Normandy was annexed to England. On the death of William it was separated from England and was ruled by his son, Robert, but it was afterward again ruled by the kings of England, until Philip Augustus took it from John and united it with France in 1203. Although it was several times retaken by the English, it was finally recovered by the French in 1419-1450. Normandy is one of the richest and most fertile parts of France.

NORMANS (north men), a term designating all Scandinavians, but also in later usage denoting specially the people of Norway. Commonly it refers to those Scandinavians who settled in Gaul and who gave the name Normandy to territories in what later became France. They are to be carefully distinguished from other Northmen such as the Danes because of differences in language, laws and social institutions.

From their new home, in the eleventh century they set out on expeditions to ravage the coasts of England, Italy, Sicily and other convenient lands, but eventually settled permanently in the countries named and left a deep impression on later history.

Related Articles. Consult the following titles for additional information:

England	Northmen	William I of
Normandy	Sicily	England

NORNS, in Scandinavian mythology, the three fates. Their names were Urd, Verdandi and Skuld, representing past, present, and future, and they determine the fate of gods and men. Besides these three great norns, there were lesser ones, one to determine the fate of each man as he was born. These inferior norns correspond to the goddesses of classical mythology.

NORRIS, CHARLES GILMAN (born 1881), and **KATHLEEN** (born 1880), husband and wife, among the prominent American authors of their generation. He was a native of Chicago, and was graduated from the University of California (1903). His first work was as a magazine editor (*Country Life* and *Sunset Magazine*). In the World War he was captain and major of infantry, but his command did not get to France. His books are numerous, among them, *The Amateur*, *Salt*, *Brass*, *Bread*, *Pig Iron*, *Seed*, *Zelda Marsh*, and *Zest* have been given greatest acclaim.

She was born Kathleen Thompson, in San Francisco, was privately educated, and was married in 1909. In 1910 she began writing short stories which appeared in better-class magazines. Her success inspired her husband to enter upon a literary career, they determined to work independently rather than in collaboration. She has published more than twenty volumes, among her later books are *Mother and Son*, *Margaret York*, *The Lucky Laurences*, *Beauty in Letters*, *Hands Full of Living*, *Second-Hand Wife*, *Younger Sister*, *Treacher*, *Walls of Gold*, *Wife for Sale*, *My San Francisco*, and *Angel in the House*.

NORRISTOWN, PA, the county seat of Montgomery County, fifteen miles northwest of Philadelphia, on the Schuylkill River and the Schuylkill Canal and on the Philadelphia & Reading, the Pennsylvania and other railroads. The borough is in an agricultural and mining section, and contains a number of large machine works, extensive manufactures of knitting machines, hosiery, underwear, glass, iron, wire, screws, implements, furniture and other articles. There are over fifty factories. It has a state hospital for the insane. Some of the prominent institutions are the McCann Library, a Masonic Temple, a city hall, a county courthouse, a home for aged ladies, the Montgomery County Historical Society, and a county prison. Montgomery Cemetery contains the tomb of Winfield Scott Hancock. Valley Forge is about six miles to the northwest. It was settled about 1688 and was incorporated as a borough in 1812. Population, 1930, 35,853.

NORTH, CHRISTOPHER, the pen name of the Scotch author John Wilson. See **WILSON, JOHN**.

NORTH, FREDERICK, Lord, Earl of Guilford (1732-1792), an English statesman who

was Prime Minister during the American Revolution. He became Prime Minister in 1770 and proved, while honest and well meaning, so subservient to George III that he sometimes carried out a policy of which he did not thoroughly approve. The placing of a duty on tea sold in the American colonies and the Boston Port Bill were among the revolution-provoking measures which he vigorously supported, and which later he regretted. North was totally blind the last five years of his life.



One of the original owners

NORTH AMERICA, the northern division of the two vast land masses comprising the American continent, and the third largest grand division of the world, exceeded in size only by Asia and Africa. It is becoming the most important of all the continents, though that honor is yet reserved to Europe, where there has existed a civilization for more than a thousand years. However, it contains more people who speak a common language than any other except Asia, and in its central section is the richest nation in the world, the United States, much of whose wealth is as yet undeveloped.

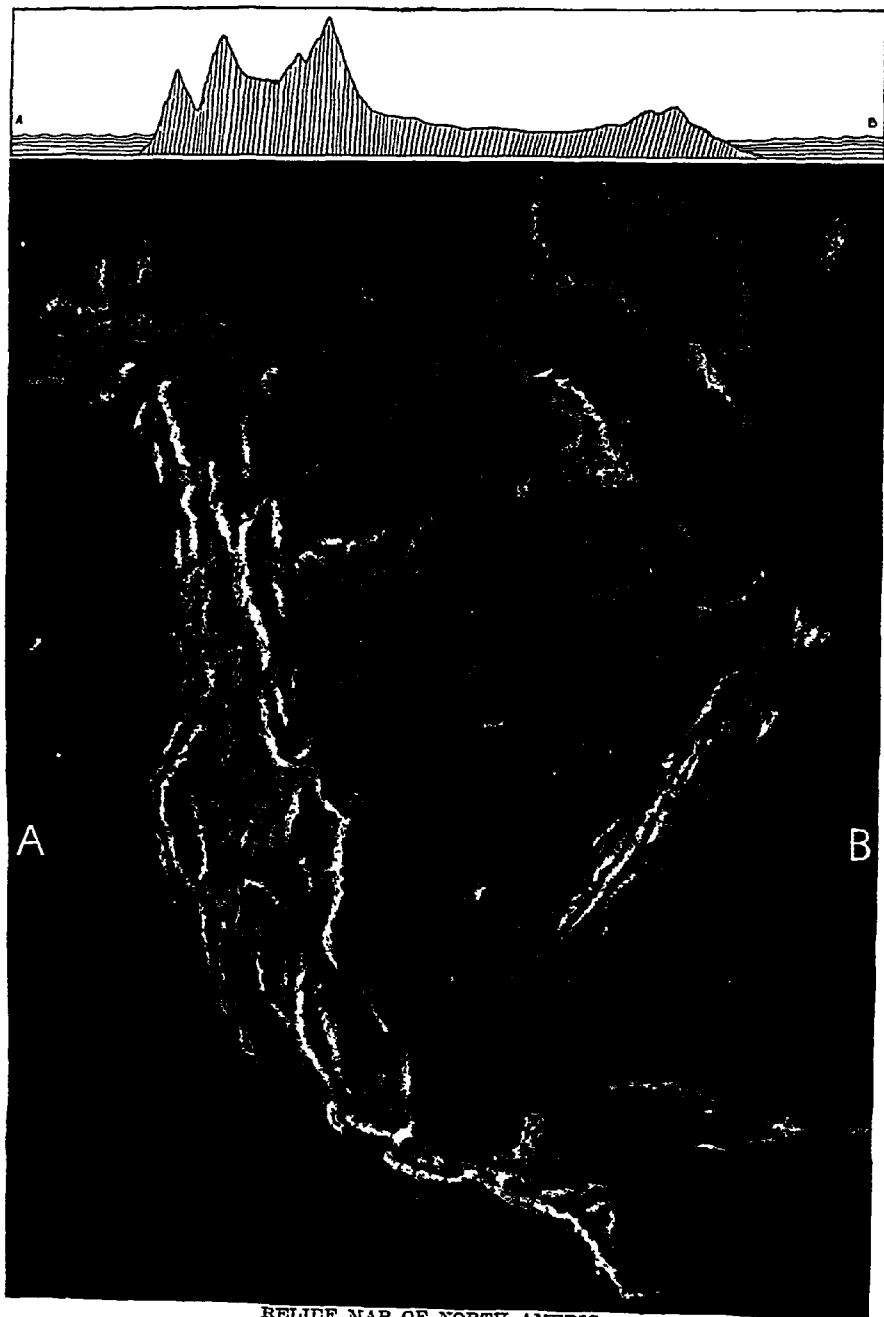
Within recent years North America has taken a position in the world which is destined to give it supremacy, particularly as Europe has felt war's devastation and has lost millions of men and billions of dollars in crushing the strongest single nation within its borders—a nation which sought to impose its will upon the world. North America possesses nearly half of the wealth of the world; this continent provides more than half of the world's cotton for clothing, two-thirds of its petroleum, three-fourths of its silver, nearly the same proportion of its gold, almost half of its cereals for bread, more than half of its copper, and, most important of all in industry, over half of its iron.

The continent is for the most part in the north-temperate zone, where the climate is such as to bring man to his highest development. In that zone lie all of the United States and the larger part of the great Dominion of Canada. The extent of the con-

tinental land mass is from latitude 9° north, in Panama, to the frozen islands of the Arctic regions, 70° 36', and from 47° to 168° west longitude. The Alaskan islands extend 20° still farther westward, beyond the international date line to a point as far west as New Zealand.

The greatest length of North America is about 4,500 miles; its greatest breadth is a little more than 3,000 miles. The area is about 8,300,000, which is slightly greater than that of South America but only about half that of Asia. The coast line is quite irregular. The chief projections on the north are Point Barrow, Boothia and Melville peninsulas; on the northeast, Labrador, on the east, Nova Scotia, Florida and Yucatan, and on the west, Lower California and Alaska. The northern and eastern coasts have a number of prominent indentations; on the north is Hudson Bay; on the east, the Gulf of Saint Lawrence, the Bay of Fundy, Delaware Bay, Chesapeake Bay, the Gulf of Mexico and the Gulf of Honduras. On the west, the Gulf of California, San Francisco Bay and Puget Sound are the only indentations of importance. However, all coasts have innumerable smaller indentations, many of which serve as fine harbors. There are numerous islands near the continent and geographically belonging to it. The most noted of these are Greenland, on the north, Newfoundland, the Bermudas, the Bahamas and the West Indies, on the east, and the Queen Charlotte and Aleutian Islands, on the west. Besides these, there are very many islands in the Arctic Ocean. They are, however, frozen wastes and of little importance.

Surface and Drainage North America is divided into three great physiographic regions. These are the Appalachian highland on the east, the Rocky Mountain highland on the west, and the great central plain occupying the vast interior of the continent and extending from the Arctic Ocean to the Gulf of Mexico. The Appalachian highland consists of a low plateau containing several ranges of mountains, which under different names extend from the Gulf of Saint Lawrence in a southwesterly direction to within about 300 miles of the Gulf of Mexico. The elevations in these mountains do not exceed 6,700 feet, the height of Mount Mitchell, near the southern extremity of the range. Mount Washington, in the White Mountains, is nearly as high. The eastern slope of these high-



RELIEF MAP OF NORTH AMERICA
At top, profile of cross section across the continent, greatly exaggerated in scale.
2583

lands is somewhat abrupt and terminates in the Atlantic plain, which varies in width from 50 miles, in the north, to about 300 miles, in the south. The portion of this plain bordering on the ocean is low, but it is bordered inland by the Piedmont region, which is higher and consists of rolling land terminating in the foothills of the mountains. The western slope of the Appalachians is rolling and gradual and terminates in the prairie region of the great central plain.

The Rocky Mountain region extends from Alaska to the Isthmus of Panama, from which point it continues as the Andean system in South America. The name *Cordilleras* is frequently given to this entire mountain system, extending through both of the American continents. The Rocky Mountain highland region consists of a plateau, varying from 3000 to 10,000 feet in altitude and from a width of a few miles, near its southern extremity, to a breadth of over 1000 miles, in Utah and Colorado. Upon this plateau are the various ranges of mountains which make up the Rocky Mountain system. Chief among these are the Rocky Mountains proper, bordering the plateau on the east; the Cascades and Sierra Nevadas, bordering it on the west, and the Sierra Madre, which extend through Mexico. To these might also be added the Coast Ranges, in the United States. The highest elevation of these mountain ranges is found in Mount McKinley in Alaska, the highest point in North America, which has an elevation of 20,300 feet. Other important peaks in this vicinity and nearer the coast are Mount Fairweather, Mount Saint Elias and Mount Logan, each exceeding 18,000 feet in altitude. The system reaches its greatest development where the plateau is widest, in the United States, and bordering this plateau are numerous peaks exceeding 14,000 feet in height. Among the best known of these are Mount Whitney, 14,502 feet; Mount Shasta, 14,380 feet; Pike's Peak, 14,108 feet, Long's Peak, 14,271 feet; Mount of the Holy Cross, 14,006 feet. In Mexico the plateau rises to an altitude of about 7,000 feet and is surmounted by a number of lofty peaks, the most noted being Popocatepetl, 17,520, and Orizaba, 18,250 feet. There are also a number of other peaks exceeding 13,000 feet. In the central part of this highland, where the plateau is widest, the mountains enclose a large area known as the Great Basin, whose waters find no outlet to the sea

and which contains a number of salt lakes, of which Great Salt Lake is the largest.

The Great Central Plain is divided by the Height of Land, which extends from Cape Chidley in an irregular line north of the Great Lakes to the Rocky Mountains and separates the rivers flowing into the Arctic Ocean from those flowing into the Atlantic and the Gulf of Mexico. This Height of Land is a low ridge which originates in the Laurentian Plateau, but it is not marked by any distinct ranges of hills or peaks. To the north of it the land slopes gradually to the north and northeast and is generally low and quite level, in the extreme northern portion being swampy and forming a tundra similar to that in Siberia. The plain to the south is divided by the Mississippi River into two unequal regions, the eastern, well watered and consisting largely of low and level prairie, and the western, which is broad, comparatively arid and rising from the Mississippi gradually to the foothills of the Rocky Mountain plateau.

The river systems of North America consist of the Arctic system, the Atlantic system, the Gulf system, the Pacific system and the inland system, draining the great basin. In a detailed description each of these is susceptible of several divisions. The chief streams in the Arctic system are the Mackenzie, the Saskatchewan and the Nelson, while in the Atlantic system the Saint Lawrence, draining the region of the Great Lakes, occupies first place. Other streams worthy of mention are the Hudson, the Delaware and the Potomac. The Gulf system includes the Mississippi, with all its tributaries, draining the greater part of that portion of the United States lying between the Appalachian and Rocky Mountain highlands. To this must be added the Rio Grande del Norte, which drains a portion of the plateau west of the Rocky Mountains. The Colorado, flowing into the Gulf of California, occupies a position peculiar to itself and drains the southern portion of the Rocky Mountain plateau. Of the streams flowing directly into the Pacific, the Columbia and the Frazer are the most important, while in the northwest the Yukon, flowing into Bering Sea, is one of the largest and most important rivers in the Arctic regions.

North America contains a larger number of lakes than any other continent. Aside from the Great Lakes, which have an area of



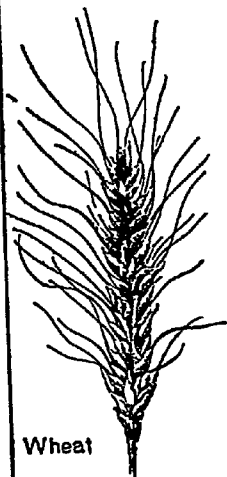
Shingle Oak



Yucca



Yellow Locust
and Flower



Wheat



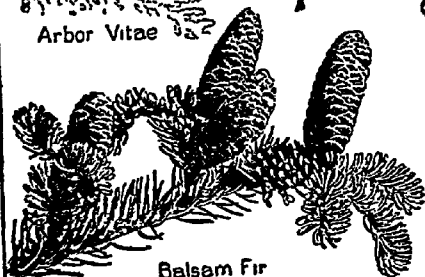
Elm



Corn



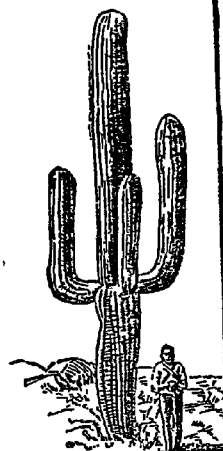
Arbor Vitae



Balsam Fir



Leaf Cactus



Giant Cactus

PLANT LIFE OF NORTH AMERICA

See, also, full-page illustration Plant Life of United States, in article United States

more than 90,000 square miles, there are, in the north, Great Bear Lake, Great Slave Lake and Athabasca Lake, each of which is an inland sea; also, Lake Winnipeg, Lake of the Woods and Rainy Lake. In the regions of both the Appalachian and Rocky Mountain highlands are found hundreds of small lakes, some of which have been formed by glacial action, while others occupy the craters of extinct volcanoes.

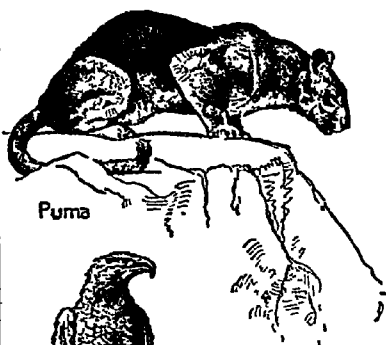
Mineral Resources. The eastern half of North America is much the older, and the Laurentian Plateau and the Height of Land constitute the oldest land known. The rocks here are coarse, and their surface has been worn and rounded so that no high elevations are found. South of the Saint Lawrence River and the Great Lakes, these highlands contain valuable deposits of coal and iron, which have been extensively mined in Nova Scotia, Pennsylvania, New York and regions farther south. The coal measures also extend westward into the prairie region, where large areas are found between the Ohio and Mississippi rivers and smaller areas south of the Ohio. In the western part of this plain, and also in certain sections in the Rocky Mountain plateau, are extensive deposits of lignite coal. The Rocky Mountain highland is rich in gold, silver, copper, lead and other minerals, and previous to the discovery of gold in Australia and South Africa, this was the most productive gold region in the world. Large deposits of copper and iron are also found in the vicinity of Lake Superior. Granite, marble, slate and other building stone, as well as clay suitable for brick, tile and pottery, are very generally distributed over the continent.

Climate. North America contains all varieties of climate, from tropical to frigid. The regions bordering upon the Arctic Ocean are so cold that the ground remains frozen throughout the year, but during the short, hot summer it thaws sufficiently on the surface to enable the vegetation of the region to blossom and bear fruit. To the south of this, the climate varies widely between the eastern and western coasts. Owing to the warm winds of the Pacific and the cold winds of the Atlantic, regions having the same latitude on these opposite coasts differ as to their mean annual temperature and amount of moisture. This is well illustrated by the climate of British Columbia and Labrador, the former having a comparatively mild cli-

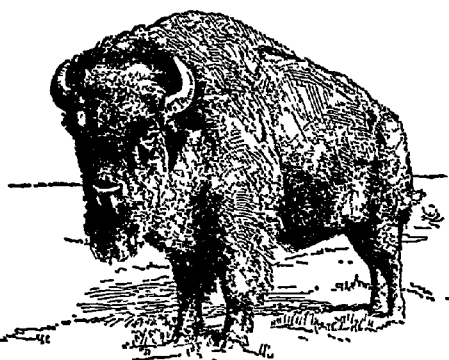
mate, while the latter has winters so severe that it is scarcely inhabitable. In general, places along the Pacific coast have a more equable climate than those along the Atlantic. The great plain in the interior is subject to sudden changes and extremes of heat and cold, because the position of the mountain ranges is such as to allow north and south winds to sweep over it alternately.

The rainfall along the Pacific coast is quite heavy, but the high mountains rob the air currents of most of their moisture, so that the region east of the Cascade and Sierra Nevada mountains is arid. The southern part of the central plain receives its moisture largely from the Gulf of Mexico and is well watered, with the exception of its western border, which is too far from the Gulf to receive the benefit of winds from that direction and is so situated in reference to the Rocky Mountains that the westerly winds are deprived of their moisture before reaching it. Thus, an arid region is constituted, which, however, has sufficient moisture to maintain grass and some other species of vegetation. The Atlantic coast is, in general, well watered. The northern portion of this plain is characterized by deep snows during the winter.

Vegetation. In the extreme north, the vegetation consists of reindeer moss and those flowering plants which mature during the few weeks of the Arctic summer. The southern border of this region is marked by willows and other shrubs. A little southward, forests of cone-bearing trees, spruce, fir, hemlock and pine, are found. These forests extend across the continent from the region south of Hudson Bay to the Pacific coast, thence southward along the Cascade and Sierra Nevada mountains nearly to San Francisco. In the eastern highland, forests of hard wood and pine are found generally distributed as far south as the Gulf and along the Gulf as far west as northeastern Texas and Arkansas. In the south, these forests consist largely of pine and cypress. The northern part of this forest region extends westward as far as the Mississippi River, and in the vicinity of the Great Lakes the extensive pine areas have given rise to a large lumber industry. In general, the prairie region and the great plains are treeless, except along the banks of streams and around other bodies of water, but originally they were covered with a heavy growth of grass. In the southwestern part



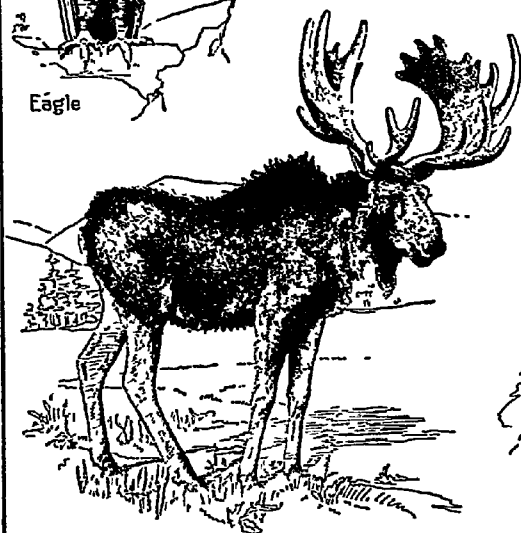
Puma



Bison



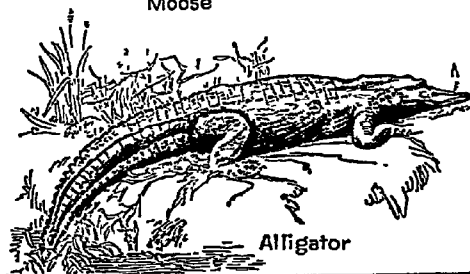
Eagle



Moose



Bear



Alligator



Wolf

ANIMALS OF NORTH AMERICA

2587

See, also full-page illustration Animals of the United States, in article United States

of the United States are extensive growths of cactus. For cultivated plants, see the subhead *Agriculture*, under the various articles on political divisions of the continent.

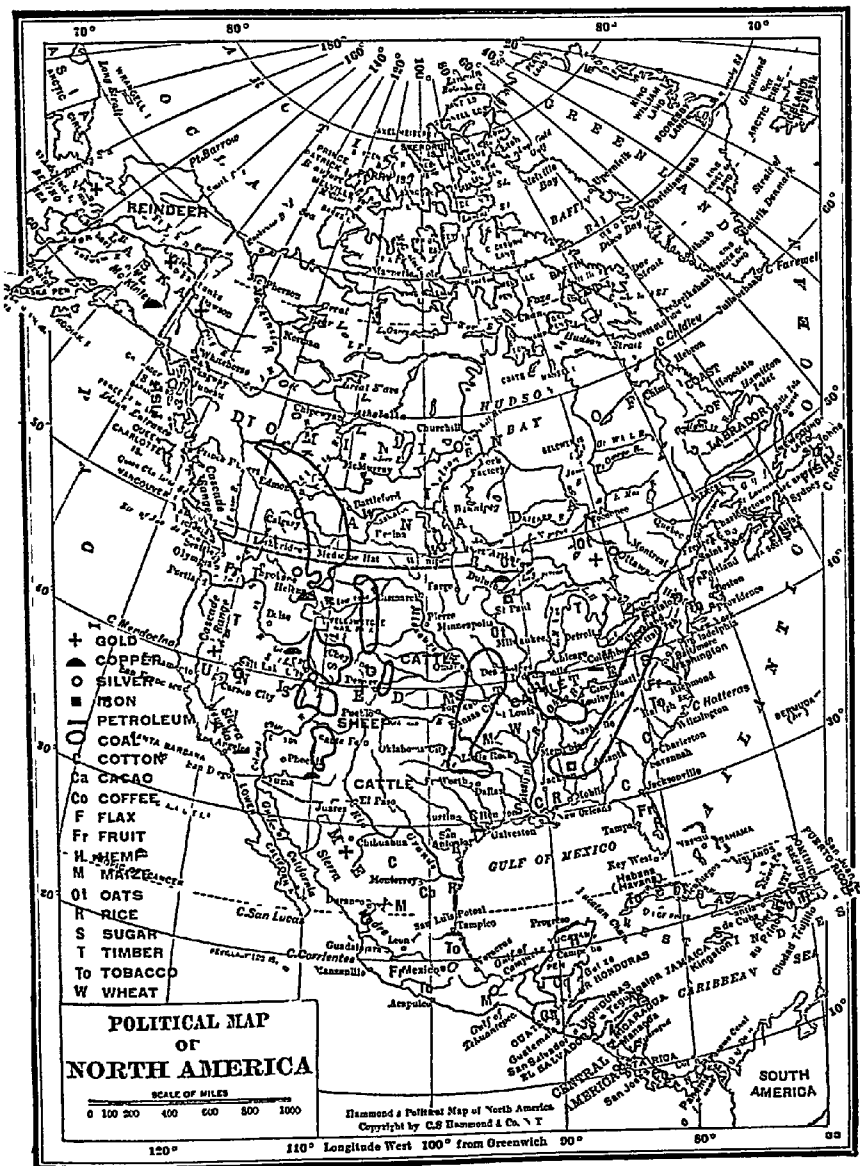
Animal Life. When first discovered by white men, North America contained a large number of wild animals, including a wide range of species. In the extreme north all of these are still found, the most important animals of this region being the walrus, the polar bear, the fur seal and the caribou, or American reindeer. The Arctic fox, the beaver, the otter, the marten and other fur-bearing animals are also found in this region. In the southern belt of this region, extending as far south as northern Maine, are found the moose and the deer. In the Rocky Mountain region are found the elk, the deer, the Rocky Mountain sheep and, among carnivorous animals, the wolf, the coyote and the black, brown and grizzly bears. Large herds of bison formerly roamed over the central plain, but these animals are now nearly extinct, and only a few herds are found in national and private parks. These plains were also the home of the gopher and the prairie dog. In the Appalachian region are found the fox, the raccoon, the possum, the mink, the skunk, the lynx, the wild cat and the black bear, while squirrels and other small animals are found throughout the continent. There are many species of birds, ranging from the highly colored toucans, toward the extreme south, to the wild ducks and geese of the north. The most conspicuous of the larger birds are the gull, the falcon, the vulture, the turkey buzzard, the owl, the wild turkey, the crane, the heron, the flamingo, the swan, the wild goose, the duck and the pelican. Among the smaller birds larks, orioles, thrushes, robins, bluebirds, parrots, swallows, blackbirds and grosbeaks are the most familiar. The reptiles are not conspicuous, most of the snakes being harmless. The only venomous species are the rattlesnake, the copperhead and certain varieties of watersnake. The alligator found in the lagoons around the Gulf of Mexico is the largest reptile on the continent. There are thousands of species of insects, including flies, moths, butterflies, bees and beetles. Some of these are noted for their gorgeous hues, but many of them are conspicuous only for their destruction of vegetation.

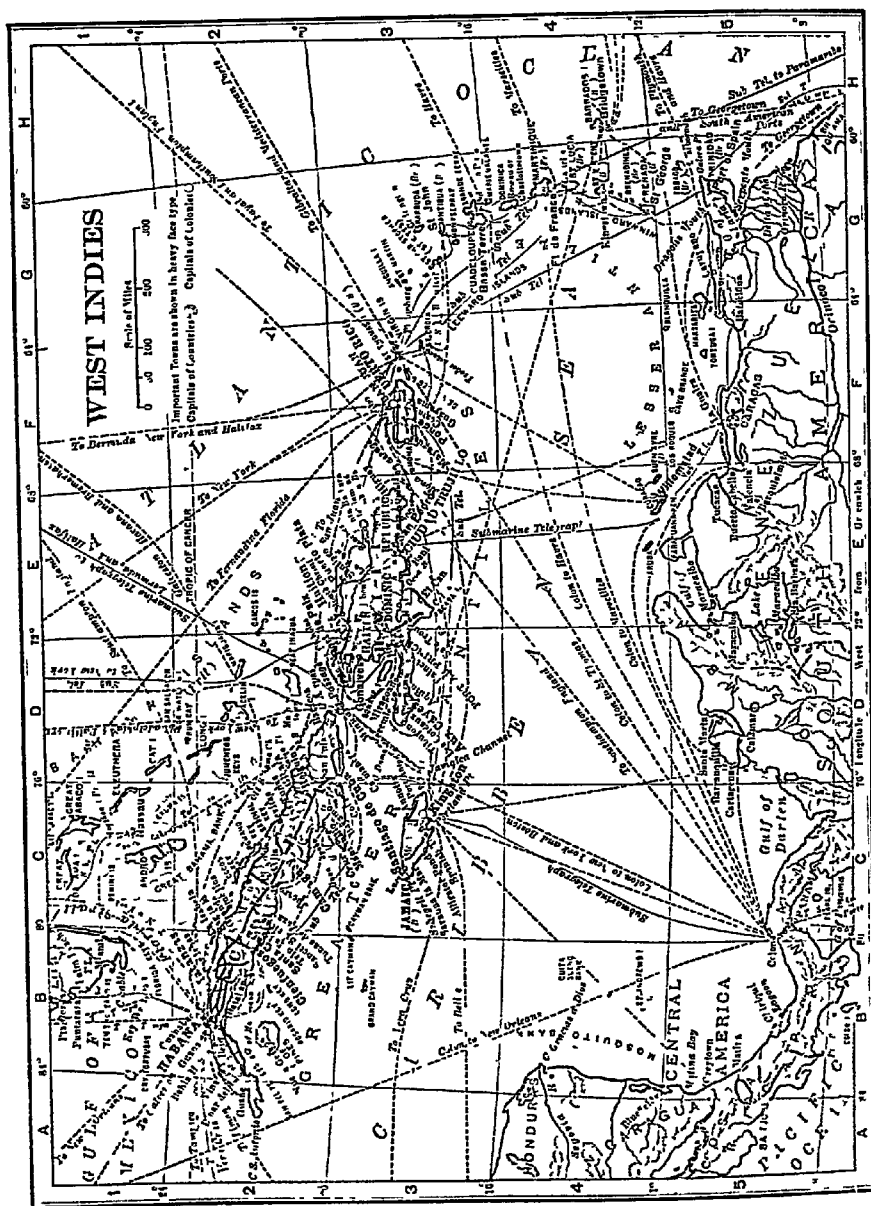
Inhabitants. When North America was discovered it was inhabited by a copper-

colored race, to whom the name *Indians* was given. While this race has become nearly extinct, as civilization on the continent has progressed, remnants of it are still found from the extreme north to the south. Among the present inhabitants of North America are found representatives of every European nationality, a large number of people of African descent and a number of Mongolians. In general, in Mexico and Central America people of Spanish descent predominate. The United States contains representatives of every European nation, but those of English descent far outnumber any other. The colored inhabitants of the continent are confined chiefly to the Southern states of the United States, and in the Canadian provinces are found people of English and Scotch descent, while the Province of Quebec is peopled almost entirely by the descendants of the early French colonists.

Political Divisions. The independent countries of North America, including islands, are the United States, Mexico, Guatemala, Honduras, San Salvador, Nicaragua, Costa Rica, Cuba, Santo Domingo and Haiti. Canada is an independent member of the British Empire. The British colonial possessions are Newfoundland, Belize, or British Honduras. The islands of Saint Pierre and Miquelon belong to France.

History. America was first made known to the world by Christopher Columbus in 1492. The continent of North America was first discovered by John Cabot in 1497, and the New World was named after Amerigo Vesputius, who was the first to write a description of it. During the sixteenth century many voyages of discovery were made by the Spanish, Portuguese, English and French. The Spaniards colonized Mexico and made attempts to settle in what is now the southern part of the United States. The French also made attempts to settle on the coast of the United States and along the Saint Lawrence, but no permanent settlements were established in these regions until the beginning of the seventeenth century, when the English settled in Jamestown, Va., in 1607, and at Plymouth, Mass., in 1620. The French made their first settlement at Quebec in 1608. During the century following, the continent was practically divided among Spain, Great Britain and France, but in 1763, at the close of the French and Indian wars, France ceded her claim to Great Britain and the continent







Eskimo
Snowshoe



Pueblo, Southwestern United States
and Mexico



Tomahawk
and Arrow



Zuni Woman,
New Mexico



Handiwork



A North American Indian
Chief



An Early Day Indian Camp

Outline on North America

In preparing an outline of a great continent one is confronted with the necessity of including an almost endless amount of detail or of limiting the record practically to its physical features. The latter is the logical method to employ, for a continent is always divided into countries and the countries still further sub-divided, in detail. In a great land division of the immensity of a continent we seek only general physical characteristics, and leave more intimate study of peoples, governments, industries, and the like until we reach in turn its various political divisions. In the foregoing pages these smaller divisions have been given due consideration.

A satisfactory outline of North America, or of any other continent, should include every important physical feature in its boundaries, definitely named and in a general way located. The chief characteristics of the surface of the continent merit like careful treatment. The following may be considered a typical outline:

I. POSITION

- 1 Latitude 9° to $70^{\circ} 36' N$
- 2 Longitude $47^{\circ} 30'$ to $168^{\circ} W$.

II. EXTENT

1. Length 4,500 mi.
- 2 Breadth (greatest) 3,000 mi.
- 3 Area 8,300,000 sq. mi.
- 4 Rank, 3d

III. 1. Projections

(a) North

Cape Lisburne
Point Barrow
Cape Bathurst
Boothia Felix Peninsula
Melville Peninsula
Cape Wolstenholme
Cape Chidley

(b) East

Cape Charles (north)
Nova Scotia Peninsula
Cape Cod Peninsula
Cape Hatteras
Florida Peninsula
Yucatan Peninsula

(c) West

Lower California Peninsula

Cape Mendocino

Cape Blanco

Cape Flattery

Alaska Peninsula

2. Coast Waters

(a) North

Arctic Ocean
Dolphin and Union Strait
Gulf of Boothia
Committee Bay
Ferry and Hecla Strait
Fox Channel
Hudson Bay
Ungava Bay

(b) East

Atlantic Ocean
Gulf of St Lawrence
Bay of Fundy
Massachusetts Bay
Long Island Sound
New York Bay
Delaware Bay
Chesapeake Bay
Gulf of Mexico
Gulf of Campeche
Caribbean Sea
Gulf of Honduras

(c) West

Pacific Ocean
Gulf of California
San Francisco Bay
Puget Sound
Strait of Juan de Fuca
Queen Charlotte Sound
Strait of Georgia
Prince William Sound
Cook Inlet
Bering Sea
Bristol Bay
Norton Sound
Kotzebue Sound

IV. ISLANDS

1 Arctic Ocean

Greenland
Baffin Land
North Somerset
Prince of Wales Land
Prince Albert Land

- Banks Land
- Parry Islands
- 2 Atlantic Ocean
 - Newfoundland
 - Cape Breton Island
 - Prince Edward Island
 - Anticosta
 - Martha's Vineyard
 - Nantucket
 - Elizabeth Islands
 - Long Island
 - Bermuda Islands
 - Bahama Islands
 - West Indies
- 3 Pacific
 - Revillagigedo Islands
 - Santa Barbara Islands
 - Vancouver Island
 - Queen Charlotte Islands
 - Prince of Wales Island
 - Baranof Island
 - Kadiak Island
 - Alutian Islands
 - Pribilof Islands
- V SURFACE
 - 1 The Appalachian Highlands
 - (a) Mountain ranges
 - White Mountains
 - Green Mountains
 - Adirondacks
 - Catskill
 - Blue Ridge
 - Allegheny
 - Cumberland
 - (b) Piedmont Plateau
 - (c) Coastal Plain
 - 2 The Rocky Mountain Highlands
 - (a) Mountain Ranges
 - Rocky Mountains
 - Cascade Range
 - Sierra Nevada
 - Coast Range
 - (b) Eastern foothills
 - (c) Coastal Plain
 - 3 Great Central Plain
- VI DRAINAGE
 - 1. Watersheds
 - 2. River Systems
 - Atlantic System
 - Gulf System
 - Saint Lawrence
 - Hudson Bay
 - Mackenzie

- Columbia
- Colorado
- Rivers of the Great Basin
- 3 Lakes
 - Lakes of the Appalachian Highlands
 - Lakes of the Great Central Plain
 - Lakes of the Rocky Mountain Highlands
- VII CLIMATE
 - 1 Temperature
 - 2 Rainfall
 - 3 Winds and storms
- VIII MINERALS
 - 1 Gold and silver
 - 2 Iron
 - 3 Copper
 - 4 Lead
 - 5 Other metals
 - 6 Mineral fuels
 - 7 Building Stone
- IX VEGETATION
 - 1 Forest areas
 - 2 Prairie regions
 - 3 Desert regions
- X ANIMAL LIFE
 - 1 Large animals
 - 2 Small animals
 - 3 Birds
 - 4 Fish
 - 5 Insects
- XI INHABITANTS
 - 1 Indians and Eskimos
 - 2 Other nationalities
- XII POLITICAL DIVISIONS
 - 1 Canada
 - 2 United States
 - 3 Mexico
 - 4. Central American states

In studying North America in connection with an outline such as is given above, every important fact regarding the continent is brought to view and in proper sequence to assure a logical development of geographic knowledge. If the teacher will assign one subheading at a time, or divide long subheadings into parts, mastery of all facts is rendered easy, with a certainty that no important item of value has been neglected. The same suggestions can be carried out successfully in connection with all the continents.

Wonder Questions on North America

In what features does North America surpass any other continent?

North America possesses the deepest and grandest gorge in the world, the Grand Canyon, the highest cataract, the falls of the Yosemite, which drop 2,660 feet in three leaps, the largest glacier field, found in Alaska, the world's largest and oldest living things, the "Big Trees" of Sequoia Park, the only natural bridges on the globe, the largest underground cavern, Mammoth Cave of Kentucky, the largest body of fresh water, the Great Lakes, the longest river system, the Missouri-Mississippi, the largest field of radium ore, in Utah and Colorado, the most extensive coal fields, the most valuable silver mines, the most productive petroleum fields

Are the names North and South America strictly accurate?

The two continents of the Western world could appropriately be called West and East America, for most of South America lies east of the longitude of New York City, and no part of it is as far west as Detroit. South America lies closer to Africa than Chicago does to San Francisco, while the northwesternmost point of North America is but a few miles from the Siberian shore. If it were not for the fogs in Bering Strait one could stand on the American coast and see in the distance the hills of Asia. North America is so far west that the end of the chain of islands off Alaska reaches a point beyond the international date line. The quickest way for a North American to reach the Far East is to travel westward.

If the eastern coast of North America had been like the western, would the history of the United States have been written as it is?

Having only the implements and mechanical inventions known before the nineteenth century, no people could have colonized a coast country like that on the western border of the continent. From Lower California to the Canadian border there are but two good harbors, the estuaries of the Sacramento and the Columbia rivers, and high mountains all along the coast rise almost out of the sea. The Atlantic coast of the United States twists and turns in endless variety, forming scores of good harbors, and it presented to the early settlers from Europe an ideal country for colonization. The mountains in the east are not high, and are back of the great coastal plain that was so admirable a site for thriving cities. Nature turned the favorable side of the continent toward the

nations best qualified to develop it. Had conditions been reversed there probably would have been no United States as it exists to-day.

What size and shape had North America in the early stages of its existence?

At the close of the earliest geological era the principal nucleus of the continent was a land mass occupying what now corresponds to the eastern half of Canada, the Adirondack region of New York and a projection southward east of the Blue Ridge. From this nucleus the continent grew westward by successive upheavals of the earth's crust. The oldest mountains are the Laurentian Highlands of Canada, the youngest are the lofty ranges of Southern Alaska, in which is found Mount McKinley, the highest peak on the continent.

If the waters of the sea were removed, how would the continent appear through a gigantic telescope, viewed from space?

If we could view the continent somewhat as astronomers now examine the moon, we would see a huge triangular plateau resting in a vast trough representing the ocean bed. Around the border we would see a continuous margin sloping toward the depths of the basin. This is the continental shelf, the submerged part of North America. The surface of our great plateau would appear rough, but the tops of the highest peaks would not be so high above the level surface of the land as the highest parts of the continental shelf would be above the bottom of the trough. The West Indies and other islands would appear like giant mountains rising from the ocean floor.

What are the dimensions and character of the continental shelf?

The great fringe around North America extends southward to within 500 miles of the equator, and probably reaches nearer than that to the North Pole. The water covering it is 100 fathoms deep (about 600 feet). Counting the irregularities of its border, its circumference is about equal to that of the earth, or 25,000 miles. It is about fifty miles in average width, and has an area of about 1,000,000 square miles. It is composed chiefly of sediment washed from the land, and deposits of mud and ooze, formed by the hard parts of myriad plants and animals living in the sea. In the northern regions the shelf has been partially built up by the debris carried seaward by shore ice and icebergs.

was divided between Great Britain and Spain. After the American colonies established their independence, by purchase and conquest, the United States obtained possession of the Spanish territory north of Mexico

Related Articles. The geography, government, history, industries and people of each political division are treated in these volumes in the articles on the respective countries and states. Accompanying each article is a list of related topics. For more general information see the following titles

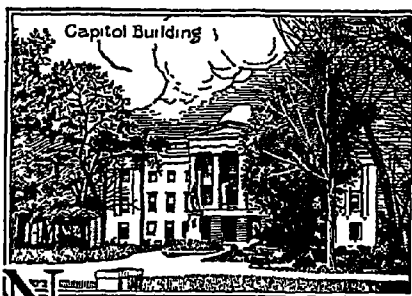
GENERAL		
Artec	Gold	Piedmont
Coal	Indians	Region
Columbus,	Iron	Silver
Christopher	Lumber	Vespucius.
Forests		Americus

NORTHAMPTON, MASS, the county seat of Hampshire County, eighteen miles north of Springfield, on the Connecticut River and on the Boston & Maine and the New York, New Haven & Hartford railroads. Smith College for women is located here. The city has a number of public institutions, including the Clarke Institute for Deaf Mutes, two hospitals, a state insane asylum, a home for aged women, Burnham Classical School for girls, an agricultural school, Academy of Music, the public, Forbes and Lilly libraries, and Capen School. There is also here a unique and interesting work of home culture clubs, planned and inaugurated by George W. Cable, for the improvement of the people, using three large buildings for social meetings and educational classes. There is a state armory. The city is located on elevated ground, amid beautiful scenery, near Mount Tom and Mount Holyoke. Both of these peaks are ascended by railways and afford magnificent views. The principal manufactures are silk, cutlery, brushes, lumber products, hardware, furniture, hosiery and various other articles. The place was settled by a company from Springfield in 1654 and was chartered as a city in 1883. Jonathan Edwards was a minister here from 1727 to 1750. Population, 1920, 21,951, in 1930, 24,381, a gain of 11 per cent.

NORTH BAY, ONT, the county town of Nipissing County, on Lake Nipissing and the Canadian Pacific Ry, three divisions of the Canadian National Ry, and the Temiskaming & Northern Ontario Railway. The Canadian Pacific Railway has extensive repair shops here and the town is also known as the gateway to the Cobalt and Porcupine mining districts. It is an important point for tourists and sportsmen, since there is excellent fishing and hunting in the immediate vicinity.

It has a technical school, a collegiate institute, and a provincial normal school. The town owns and operates its water works, and is well lighted by electricity. Population, 1931 census, 15,528.

NORTH CAPE, a rocky promontory on the island of Magero, off the northern coast of Norway, in latitude $71^{\circ} 11'$ north, considered as the extreme northern point of Europe, although it is a few minutes south of Knivskjoerodde, a few miles west of it. The northernmost point of the European mainland is Cape Nordkyn, forty-four miles east of North Cape, in latitude $70^{\circ} 7'$.



NORTH CAROLINA, one of the foremost manufacturing and agricultural states of the Southern group, popularly known as the **OLD NORTH STATE** and the **TAR-HEEL STATE**. North Carolina is represented on the American flag by one of the thirteen stripes, for it belonged to the group of original colonies that united to win independence. Only Minnesota and Florida among the states of the Union surpass it in extent of water surface, and within its boundaries is the highest point east of the Rocky Mountains.

Location and Area. North Carolina is south of Virginia, the most northerly of the South Atlantic states. Its entire eastern boundary is formed by the ocean, and South Carolina and Georgia adjoin it on the south. North Carolina is bounded on the west by Tennessee, the two states being separated by the Great Smoky Range. With a gross area of 52,426 square miles, it ranks twenty-seventh in size among the states. Its water surface, which reaches a total of 3,686 square miles, is augmented by the lagoons and sounds that indent the coast. Alabama is almost the same size as North Carolina, being only 428 square miles smaller. Arkansas exceeds it by about 900 square miles.

The People and Cities By the census of 1920, North Carolina had 2,559,123 inhabitants, in 1930, its population had grown to 3,170,276, ranking it as the twelfth state, with a density of 65 persons to the square miles. Twenty-nine per cent of the inhabitants are Negroes, and there are nearly 17,000 Indians, but the percentage of foreign-born is almost negligible. The state has eight cities with populations exceeding 25,000, the largest of which is Charlotte, with a population in 1930 of 82,675. The next seven, in order of size, are Winston-Salem, Greensboro, Durham, Asheville, Raleigh (the capital), High Point, and Wilmington.

The Baptists, who include about half the church members, are the strongest religious body. Next in number are the Methodists. Other sects include the Presbyterians, Lutherans, Disciples of Christ, Episcopalians, Congregationalists and Roman Catholics.

Surface and Drainage. The state is naturally divided into three surface regions—the coastal plain, the Piedmont plateau and the highlands. The first, extending inland from 120 to 160 miles, varies in altitude from sea level to less than 500 feet, the eastern portion of this consists in many places of lagoons and swamps, of which Pamlico and Albemarle sounds are the most prominent. These shallow indentations are separated from the sea by a low bar, which extends along the entire coast, and the chief projections on this bar constitute capes Hatteras and Lookout. The coastal plain has its western border at the Fall Line and is succeeded by the Piedmont Plain, or plateau, which occupies a region extending westward until it meets the foothills of the Appalachian mountain system.

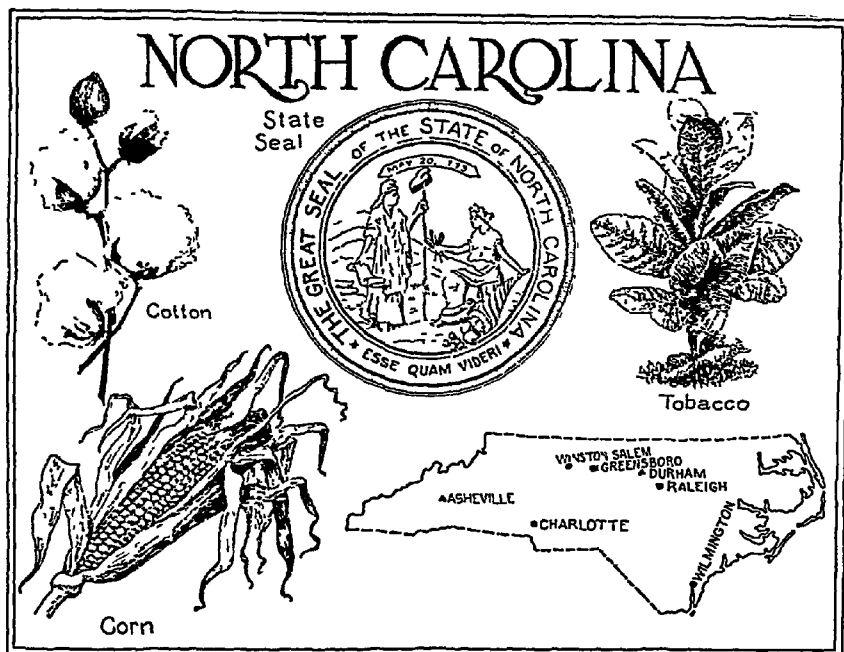
The Piedmont region varies in altitude from 200 to 1,200 feet. The surface is rugged and hilly in the western part, but quite level or undulating in the eastern. This region is separated from the western plateau of the state by the Blue Ridge Mountains. The western highland region, including the Great Smoky and Black mountains, ranges in elevation from 1,000 to 6,000 feet. Mount Mitchell, in the Black Mountains, 6,711 feet high, is the highest point east of the Mississippi River, and there are forty-two other peaks in the state that have altitudes of 6,000 feet or more. The region is heavily timbered, and the valleys between the mountains are threaded

by numerous streams. Because of its scenery and salubrious climate this part of North Carolina is a favorite resort, both summer and winter.

The region west of the Blue Ridge is drained into the Mississippi through the Hiwassee, the Little Tennessee, the French Broad, the Watauga and the New rivers, the largest of which are the Little Tennessee and the French Broad. East of the Blue Ridge the rivers flow directly into the Atlantic or southward into South Carolina and thence to the ocean. Beginning with the west the important streams, in their order are the Catawba and the Yadkin, which flow into South Carolina, the Cape Fear, the Neuse, the Tar, the Roanoke and the Chowan, which flow into the Atlantic. The Tar and the Neuse find outlets through Pamlico Sound, and the Roanoke and the Chowan flow into Albemarle Sound.

Climate. North Carolina lies on the same parallel of latitude as the central Mediterranean basin, its climate is modified by the proximity of the ocean on the east and the great mountain system on the west. The mean temperature of the state is 59° F. January is the coldest month of the year but the thermometer only occasionally registers as low as 15° above zero except at high altitudes in the mountains. July is the warmest month but the temperature is rarely higher than 95°. The rainfall is fairly uniformly distributed throughout the year, the average precipitation being fifty inches. The lowest rainfall is in the autumn season when the average is 9.8 inches, and the heaviest is in the summer season when the average is 16.8 inches. The average snowfall is 5 inches but snow seldom remains on the ground more than a day or two except in the mountain section. North Carolina is relatively free from storms. The shipwrecks that occur along her coast are due primarily to the sand bars and shallow water rather than to storms.

Mineral Resources. The mineral products have a total value in average years of around \$12,000,000. The chief minerals are building stones and clays. The state ranks first in the production of kaolin, used extensively in the manufacture of white earthenware, porcelain, and wall tile. Its quarries yield granite, limestone and sandstone to the value of several million dollars a year. The granite mine at Mt. Airy has



no superior in quality North Carolina is the leading mica state, its white mica being equal in quality to that found anywhere in the world. The yearly output of this mineral is valued at about \$300,000.

Before the discovery of gold in California, North Carolina was an important state in the production of this metal. During the period before the discovery of gold in California there had been mined in North Carolina around twenty-three million dollars worth of gold. The output in later years has been negligible. Other minerals include magnetite ore, mined in Avery county, talc, which is widely distributed, zircon and monazite, used in the manufacture of incandescent light mantles, copper, lead, feldspar, abrasive garnet, gems, quartz and a small quantity of silver. North Carolina ranks second among the states in the variety of minerals but is not among the leaders in the total value of output.

Fisheries The large sounds and estuaries along the North Carolina coast are valuable fishing grounds, and supply large quantities of shad, oysters and herring. Diamond-back terrapin, turtles, alewives, clams, bluefish,

bass, mullet, shrimp and crabs are also caught in paying quantities. The state is among the leaders in fish and oyster resources and gives systematic attention to their development.

Agriculture About one-half of the inhabitants of the state are engaged in agriculture, and over two-thirds of the land area is devoted to farms. North Carolina has the second largest farm population of all the states. Due to its great variety of soil and climate the state produces many different kinds of crops, and it maintains a high rank among the states in the total value of agricultural products. Texas only, among the Southern states, ranks higher. In acreage, corn is the leading crop, nearly 2,500,000 acres being under cultivation. In ordinary years the output is 50,000,000 bushels, about one-eighth that of Iowa, the leading corn state. Until recent years cotton has been the most valuable crop. The acreage devoted to cotton is around 1,600,000 and the yield varies from 800,000 bales to 1,250,000 bales. North Carolina is one of the leading cotton producing states of the South.

Tobacco since 1926 has been the most valuable crop. The acreage devoted to tobacco averages around 700,000 and the yield ranges from 300,000,000 to 500,000,000 pounds. North Carolina is the leading tobacco state of the Union, practically all her crop being of the bright-leaf, flu-cured types, going mainly into the manufacture of cigarette and pipe smoking tobacco. Wheat is second to corn among the cereals, about 4,000,000 bushels being harvested each year. Other products of importance include peanuts, Irish potatoes, sweet potatoes, oats, hay, orchard fruits, and a large variety of vegetables. North Carolina is primarily a crop producing state. However, livestock is of increasing importance and dairying has become a profitable industry, especially in the Piedmont area.

The Piedmont plateau and the upper coastal plains contain the choice farm land of the state. The mountain counties contain much valuable farm land and the extreme eastern part of the state, only a small part of which is cultivated, would be highly productive if the land were drained.

Manufactures. The rivers of the Piedmont and mountain regions furnish an abundance of water power, North Carolina ranking third among the states in electric power generated by streams. Since 1890 manufacturing interests have been rapidly developed and the annual output of manufactured products is more than one billion dollars. The two leading industries are textiles and tobacco. There are more than 500 textile mills in the state employing 125,000 workers and consuming each year around 1,300,000 bales of cotton, or more cotton than is consumed by the textile mills of any other state. The tobacco industry ranks first in the state in value of output, the amount being above \$500,000,000 a year. North Carolina manufactures two-thirds of all the cigarettes made in the United States and is far ahead of any other state in the manufacture of tobacco. Since two-thirds of the state is in forest, lumbering is a very important source of income throughout the entire state. The furniture industry is also very important, North Carolina being among the leaders in this respect. Tar, pitch and turpentine, for which the state was once famous, are no longer of much importance. Other industries of importance are cottonseed oil and cake flour, the tanning and curing of leather, and

the manufacture of fertilizer. North Carolina ranks high among the states in the value of manufactured products and, except for Texas with her vast petroleum industry, is first in the South.

Transportation and Commerce. North Carolina has four railway systems, the Atlantic Coast Line, the Southern, the Norfolk Southern and the Seaboard Air Line. There are also a number of less important lines and branches. The total mileage exceeds 5,200. Wilmington is the chief port of the state. It is an important port of call for both coastwise and transatlantic ships. The entire eastern part of the state is well supplied with inland waterways. North Carolina with more than 5,000 miles of hard surfaced highways and all told around 55,000 miles of roads in her state highway system is unsurpassed in highway facilities and in highway administration. All roads in North Carolina are maintained by the state.

Government. The legislature consists of fifty senators and 120 representatives, all elected for two years. The legislature meets biennially. At the head of the executive department is the governor, assisting him are an executive counsel, a lieutenant governor, a secretary of state, an auditor, a treasurer, a superintendent of public instruction, an attorney-general, each elected for four years, except the executive counsel who is appointed by the governor. These officers except the executive counsel, the lieutenant-governor and attorney general, constitute a council of state, which acts in an advisory relation to the governor. The latter has no veto power but he does make many appointments of importance, and as director of the budget has strict control over the fiscal affairs of the state. The courts consist of a supreme court, comprising a chief justice and four associates, superior courts, district courts and justices of the peace. A superior court is required to hold sessions in each county at least twice a year. Local courts are established in counties, towns and cities by the legislature, according to the needs of the different localities.

Education. During the period preceding the Civil War, North Carolina ranked well in educational matters. For many years following the Civil War she ranked among the last states in this respect. Since 1890, the state has made rapid strides educationally and now has an excellent public school sys-

tem Separate schools are provided for white and colored pupils, and out of a total enrollment of about 900,000, 260,000 are Negroes There is a compulsory attendance law which has done much to reduce the illiteracy rate for the state Although the state superintendent of public instruction exercises general supervision over the schools, in reality her school system, which is completely state-wide and state-supported for an eight-month term, is run by a state school commission North Carolina is the only state with a state-wide, exclusively state-supported system of public schools The eight month state term may be extended in larger municipalities by local vote The state makes appropriations for instruction in farm life and industrial arts These courses are given in county schools of specified qualifications

At the head of the system of public education stands the Greater University of North Carolina (which see), consisting of the State University, located at Chapel Hill, the College of Agriculture and Engineering, located at Raleigh and the North Carolina College for Women, located at Greensboro Besides these institutions there are approximately thirty other colleges and universities in the state, most of which are supported by religious denominations Among the more important ones are Duke University at Durham, with a rich endowment and a plant valued at more than \$20,000,000, Davidson College, at Davidson, Guilford College at Guilford, Wake Forest College at Wake Forest, Meredith College at Raleigh, and Salem College at Winston-Salem Among schools especially designed for colored students are the state-supported Agricultural and Technical College at Greensboro, Shaw University at Raleigh, and Livingstone College at Salisbury.

Institutions The charitable and penal institutions of the state include hospitals for the insane at Morgantown, Raleigh and Goldsboro, a school for the white deaf at Morgantown, home for the white blind and colored blind at Raleigh, an institution for the feeble-minded at Kingston, a tuberculosis sanitarium near Aberdeen, a soldiers' home at Raleigh, a colored orphanage at Oxford, a training school at Concord, and the state prison at Raleigh More than twenty prison camps house the prisoners employed in the maintenance of the state's highway system

History. North Carolina was first explored by the Raleigh expeditions late in the sixteenth century, but it was first permanently colonized after 1630 by settlers from Virginia In 1663 it was granted to a group of the king's favorites, whom he named lords proprietors In 1669 they attempted to establish a government based on the so-called Fundamental Constitutions, the work of John Locke, but the effort was vain, owing to the cumbersome and unsuitable provisions of the document In 1728 the proprietors sold their rights to the Crown, and North Carolina and South Carolina, which had been previously united, were governed as separate royal provinces North Carolina took a prominent part in the struggle against England and was among the first to advise the Declaration of Independence and to adopt an independent constitution In the war it was the scene of important engagements

North Carolina at first refused to ratify the Federal Constitution, but it finally added its approval November 21, 1789 After the war it steadily prospered, the only serious hindrance being its relations with western settlers, who at one time set up a separate state of Franklin, which was dissolved, but which finally became the state of Tennessee Though a slave-holding state, North Carolina constantly opposed secession until after Lincoln's first call for troops, when a popular convention passed the resolution, May 20, 1861 Thereafter it furnished double its quota of troops (120,000) and suffered the heaviest losses, both of men and of wealth, throughout the war The reconstruction contest was fought vigorously in North Carolina, but the state was readmitted to the Union June 25, 1868 A new constitution was adopted in 1876 and in 1900 it was amended so as practically to exclude Negroes from suffrage, by means of educational and property tests However, a large number of Negroes vote at the present time

Related Articles	Consult the following
titles for additional information	information
Albemarle Sound	Charlotte
Appalachian Mountains	Durham
Asheville	Elizabeth City
Greensboro	Farmico Sound
High Point	Piedmont Region
New Bern	Raleigh
Black Mountains	Roanoke River
Cape Fear	Wilmington
Cape Hatteras	Winston-Salem

NORTH CAROLINA, GREATER UNIVERSITY OF, a consolidation, by legislative act in 1931, of the State University of North Carolina, the North Carolina College of Agriculture and Engineering and the North Carolina College for Women. The Greater University stands at the head of the state system of public education.

The University of North Carolina. This is the central unit of the Greater University, located at Chapel Hill. It was established in 1789, and opened for instruction in 1795. It is co-educational only for juniors, seniors and graduates. The present organization includes a College of Liberal Arts, a College of Applied Sciences, a Graduate School, Schools of law, public administration, engineering, and pharmacy. There are over 300 members on the faculty and about 2,700 students. The library contains about 300,000 volumes. The university buildings, numbering more than thirty, are located on a spacious campus.

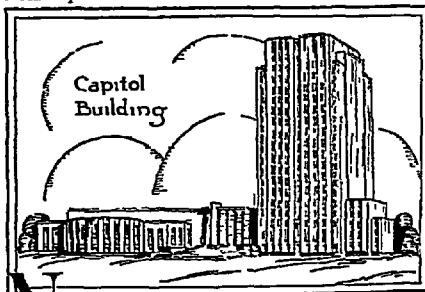
The North Carolina College of Agriculture and Engineering is located at Raleigh, and was founded in 1889. It maintains departments of agriculture and chemistry, schools of civil, electrical and mechanical engineering, a textile school, a veterinary school, and a department of vocational education. The faculty numbers over 200 and there are about 1,500 students enrolled. The college library contains about 35,000 volumes.

The College for Women of the Greater University is located at Greensboro. It was established in 1891. It maintains departments of English, mathematics, French, home economics, sociology and economics, physical education, health and hygiene. There are about 160 members of the faculty and about 1,300 students. The library contains about 50,000 volumes.

NORTHCLIFFE, ALFRED CHARLES HARMSWORTH, first Baron (1865-1922), the most influential newspaper man in the world, according to competent authorities. Harmsworth was born in Dublin County, Ireland, and began his career in London in 1888 with the founding of a small sheet called *Answers*. In 1894 he bought a failure, the *Evening News*, and made it profitable; in 1896 founded the *Daily Mail*, and in 1898 launched *Harmsworth's Magazine*. The latter was abandoned after several years, but he added other magazines to his properties. In 1908

he gained control of England's mightiest daily journal, the *London Times*, known for years as "The Thunderer." He has built great paper mills in Labrador to supply his numerous publications.

In 1904 Harmsworth was made a baronet and two years later was raised to the peerage as Baron Northcliffe. During the World War his voice and pen violently attacked whatever of mismanagement he thought existed in the British government, and his influence was very great. His unselfish patriotism was never questioned, but his attitude kept him out of the coalition Cabinet. In 1917 he was sent to the United States at the head of the British War Commission, on business connected with the economic phases of the war.



NORTH DAKOTA, sixteenth in size among the states of the American Union, has its northern limits at the international boundary, with Manitoba and Saskatchewan at the north. The Red River separates it on the east from Minnesota, South Dakota is south and Montana is west.

By the Federal census of 1930, the population was 680,845, giving it the rank of thirty-eighth among the states of the Union. The area is 70,837 square miles, which is nearly twice that of Indiana. The state flower is the wild prairie rose. The word *Dakota* is an Indian term meaning *allies*, referring to the Sioux confederation which once controlled the section. The popular name is **THE FLICKERTAIL STATE**, also called **SIoux STATE**, because of early Indian history.

Surface and Drainage. The state belongs to the great central plain. The eastern end, which is part of the valley of the Red River of the North, is nearly level and has an elevation of from 800 to 1,000 feet. This valley expands toward the north, until it reaches

a width of sixty miles near the Canadian boundary. The western edge of the valley rises gradually into rolling prairie, which reaches its greatest elevation in a height of land extending diagonally across the state from the northwest corner, and known as the Plateau du Coteau du Missouri. This plateau divides the state into two nearly equal portions. On its south and west, the surface slopes directly, and in sections quite rapidly, to the Missouri River. That portion of the state west of the plateau is more rolling and broken, in the southeastern part becoming quite abrupt, though it contains no high peaks. The highest land is Black Butte 3,468 feet high. Sentinel Butte, 2,711 feet high, is near the western boundary.

The portion of the state belonging to the valley of the Red River is drained through this stream ultimately into Hudson Bay. The principal tributaries of the Red River from Dakota are the Sheyenne, which flows southerly, then northeasterly and enters the main stream north of Fargo, and the Pembina, which rises in Manitoba and enters the Red River a little south of the Canadian boundary. The greater part of the state is drained by the Missouri, although this stream receives no important tributaries from the east. The Yellowstone joins it just after both rivers cross the western boundary, and the other chief tributaries, proceeding southward, are the Little Missouri, the Knife, the Heart and the Cannon Ball. A portion of the north central, between Turtle Mountains and the plateau, is drained by the Souris, or Mouse, which enters the state from the Province of Saskatchewan and, after doubling on its course, flows into Manitoba and unites with the Assiniboine. The state contains few lakes. The most important of these is Devils Lake, northeast of the center. This is a large body of brackish water, surrounded by trees and noted as a summer resort.

Climate. The winters are somewhat severe, but the dryness of the atmosphere renders the sensible temperature no lower than in latitudes farther south. The snowfall is light, but storms (blizzards) from the northwest occur several times during the season. Summer follows winter in quick succession, and is characterized by warm, pleasant days and cool nights. The mean annual temperature is 39.4°. The mean annual rainfall varies in different localities. At Fargo it is 27.17 inches, at Pembina, 21.91. The east-

ern half of the state has sufficient rainfall for agriculture by ordinary methods, and in the western part, dry farming is successful.

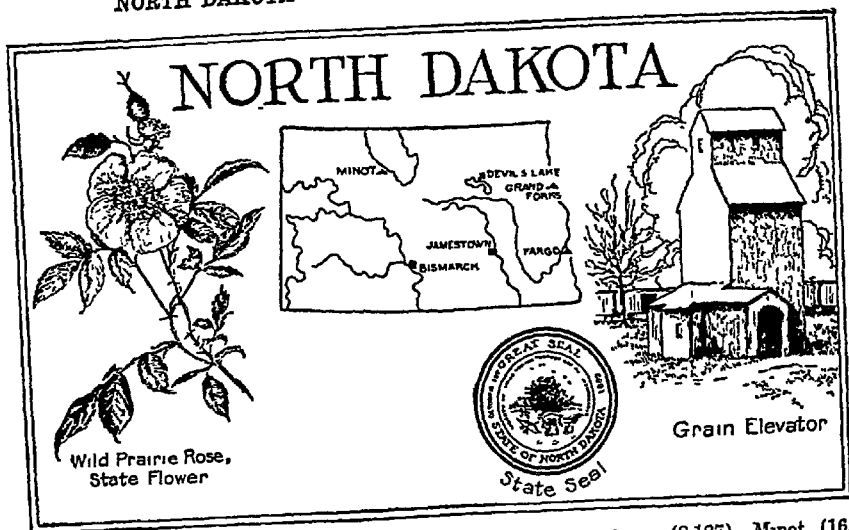
Mineral Resources. Clays from which excellent brick and pottery are made abound in various localities, building stone is found in many districts in the west and southern portion of the state. The region west of the Missouri is underlaid with extensive deposits of lignite coal of good quality, more than 1,000,000 tons are produced each year. Deposits of sodium sulphate are being developed in the northwestern part of the state. Deposits of bentonite are being worked near Belfield.

Agriculture. The soil in the eastern half of the state is unusually fertile and of great depth, especially in the valley of the Red River. The climate is particularly suited to the raising of spring wheat, and North Dakota has long been known as the leading state in the production of the variety known as Number 1 Hard, which is the best for the manufacture of flour, it constitutes 65 per cent of the wheat crop. The oats yield is about 39,000,000 bushels annually, and barley, 40,000,000 bushels. Clover is grown in the eastern part of the state. Over 18,000,000 acres of land is under cultivation, 12,000,000 acres await exploitation for agriculture.

The central and western parts are given to general farming and stock raising. The rainfall in the western part is scant, but this region is well adapted to grazing, and large numbers of cattle, horses and sheep are raised. North Dakota has at times led all of the states in the production of wheat, rye, flaxseed, barley, sweet clover seed and sweet clover hay. Average production of honey per hive in the nation has been 46.5 pounds, when the average for North Dakota was 148.6 pounds per hive. Potatoes grow in fields of from 40 to 160 acres with an annual yield of nearly 10,000,000 bushels. The average size of the 78,000 farms is 496 acres.

Manufactures. More than 374 establishments yield products valued at over \$55,000,000 yearly. Grist-mill products lead. Considerable quantities of butter and cheese are made. Brick is manufactured in many localities, marketable clays are an extensive resource with an increasing market.

Transportation. The Missouri River is navigable for river boats throughout its entire course in North Dakota. The Great



Northern and the Northern Pacific railways cross the state from east to west, the Chicago, Milwaukee, Saint Paul & Pacific crosses the southwestern corner. The Minneapolis, Saint Paul & Sault Sainte Marie, main line, passes through the state from southeast to northwest.

Education. The population of school age is about 180,000, the school system includes over 204 classical high schools, about 390 consolidated schools, over 1,570 grade schools that meet the standards of the state department of education. The land grant for schools amounts to one-eighteenth of the area of the state; one-half of this grant has been sold for more than \$20,000,000. Higher education is offered at the state university and Wesley College at Grand Forks, Jamestown College, the state agricultural college, at State College, and at teachers colleges maintained at Ellendale, Dickinson, Mayville, Minot and Valley City. The junior colleges are the School of Forestry at Bottineau and the State School of Science at Wahpeton.

Other Institutions. The school for the blind is at Bathgate, the institution for the feeble-minded is at Grafton, and the school for the deaf and dumb is at Devils Lake; the state training school is at Mandan. There is a soldiers' home at Lisbon and the penitentiary is at the capital, Bismarck.

Cities. The principal cities are Bismarck (11,090), Fargo (28,619), Grand Forks

(17,112), Jamestown (8,187), Minot (16,099).

Government. The legislature consists of a senate that cannot contain fewer than thirty, or more than fifty members, and a house of representatives that must have not fewer than sixty, nor more than 140, members. The senators are elected for four years, the representatives, for two years. The legislature meets once in two years, and the sessions are limited to sixty days. The executive department consists of a governor, a lieutenant-governor, a secretary of state, an auditor, a treasurer, a superintendent of public instruction, a commissioner of insurance, three commissioners of railroads, an attorney-general and a commissioner of agriculture and labor, each elected for two years. The courts consist of a supreme court of five judges, elected for six years, and twelve district courts, presided over by a judge for each district, elected for four years.

History. North Dakota with the exception of the Red River valley and areas draining into Hudson Bay was a part of the Louisiana Purchase. The first permanent settlement was made by a party of Canadians under Fathers Proneter and Dumoulin in 1819. Chaboulliez built the first fort or trading post in 1797. The reaper and the railroad gave to the region great promise of development and in 1851 a large portion of the territory was opened to white settlement, a part being attached to Minnesota Territory and a part

Items of Interest on North Dakota

The general shape of the state is rectangular, with an extreme length of 360 miles and an extreme width of 210 miles

West of the Missouri River are the "Bad Lands," bad for the farmer and traveler, but not for the ranchman

Among the lakes and sloughs of the prairies, wild ducks and geese are abundant, of song birds, the horned lark, the meadowlark, and the robin are the most common

North Dakota has no mountains, forests or large bodies of water to influence the extremes of temperature, the seasons are sharply marked, both summer and winter coming suddenly

The summers are short, but as there are 100 hours more sunshine in the growing season by reason of its latitude than in states farther south the growing period is adequate

Among 35 places of scenic and historic interests are 20 state parks

There are four Indian reservations in North Dakota Devils Lake, Turtle Mountain, Fort Berthold, and Standing Rock

North Dakota is situated 1,500 miles from both the Atlantic and the Pacific coasts and a similar distance from the Gulf coast and from Hudson's Outlet

Tourist travel brings into the state \$10,000,000 in a year

Questions on North Dakota

What is the area of North Dakota?
What is its extreme length? Its extreme width?

Name the principal rivers and describe briefly the drainage

What scenic attractions would you seek for in North Dakota?

What position does the state occupy relative to the land area of North America?

What minerals are found?

What kinds of manufacturing are carried on?

What railway facilities are provided for the state?

What nations have owned the territory now embraced in North Dakota?

to Nebraska Territory Dakota Territory was organized in 1861, with Yankton as the capital until 1883, when Bismarck became the seat of government The territory was divided and admitted to the Union as two states in 1889 The Sioux wars in 1864 and 1865 occurring during the period of the great Civil War sadly distressed the pioneers, these troubles ended with the death of Sitting Bull (which see) in 1890

Advanced political ideas have obtained a popular hold in the state; it was the first state to be held in the hands of a radical political movement By 1918 the Nonpartisan League (which see) had control of every department of the state government The dominant national parties revived their strength in 1921 and the League was deprived of leadership until 1932

Related Articles. Consult the following titles for additional information

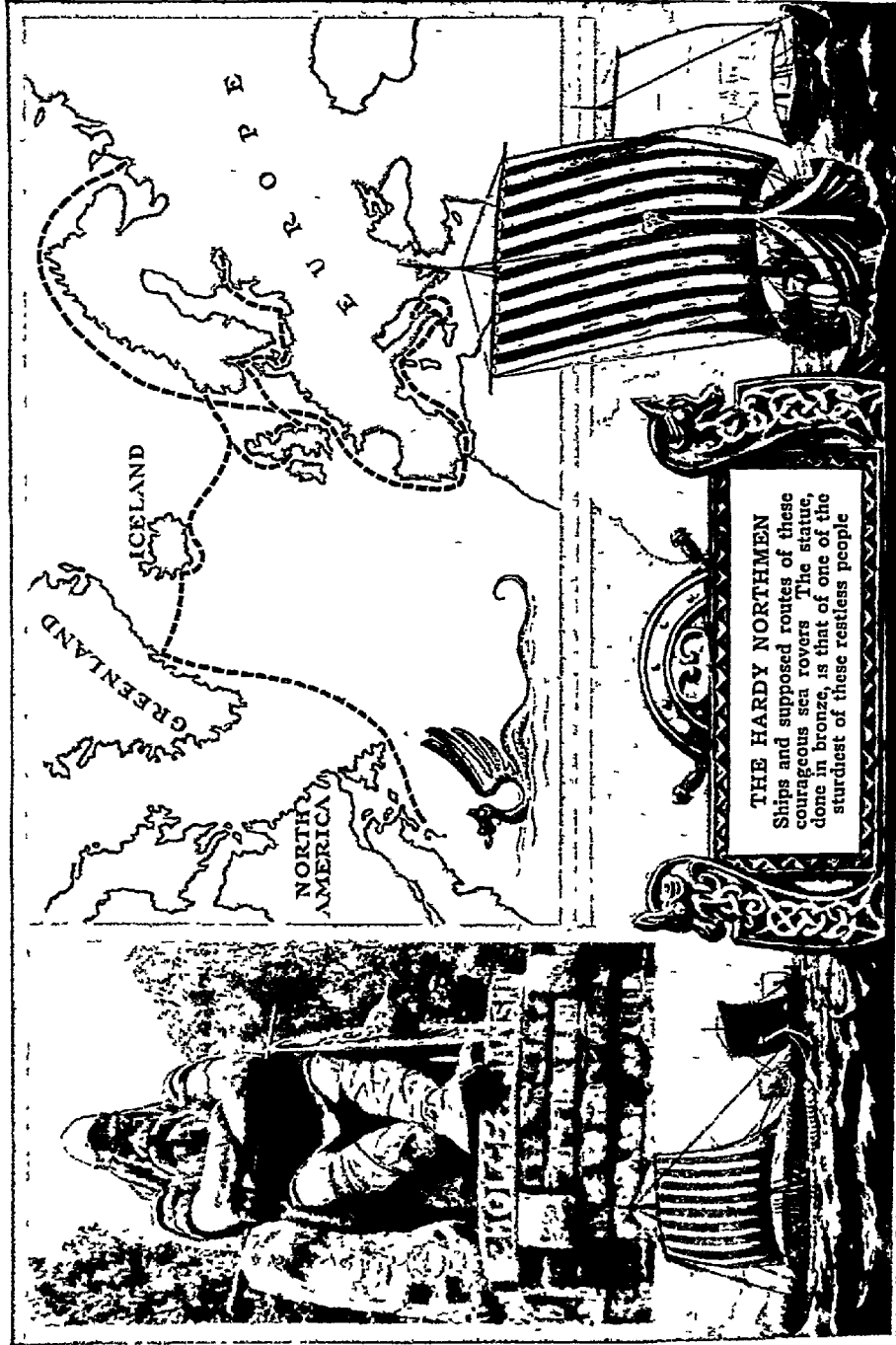
Bad Lands	Grand Forks
Bismarck	Louisiana Purchase
Devils Lake	Nonpartisan League
Fargo	Red River of the North

NORTH DAKOTA, UNIVERSITY OF, a state university established at Grand Forks in 1883 and beautifully situated on a campus of 75 acres It maintains colleges of liberal arts, law, engineering and education, a school of commerce and a school of medicine In connection with the university are a public health laboratory, the station of the United States Weather Bureau and the station of the Geological Survey Extension courses are given at numerous centers in the state. Women are admitted to all departments of the university and constitute about one-third of the enrolment Tuition is free The faculty numbers over 100 and there are about 2,200 students

NORTHER, the name given a cold north wind, which blows over Texas and the Gulf of Mexico In winter it produces a cold wave and in summer a cool wave. These winds sometimes start as far north as the Northwest Territory in Canada and proceed southward, extending a blanket of cold air over the entire Mississippi Valley. They are usually predicted from twenty-four to thirty-six hours in advance, and warnings of their approach are given by the Weather Bureau.

NORTHERN IRELAND See article IRELAND, subhead Ulster

NORTHERN LIGHTS See AURORA BOREALIS



THE HARDY NORTHERN

Ships and supposed routes of these courageous sea rovers. The statue, done in bronze, is that of one of the sturdiest of these restless people.

NORTHERN TERRITORY, a vast area, 523,620 square miles in extent, in the northern part of Australia. The white population is only about 3,900, the aborigines about 20,000. Since 1911, when the Commonwealth was established, the territory has been in control of the Federal government. In 1927 it was divided into North Australia and Central Australia, but this plan of government was found inexpedient, and in 1931 the old status was resumed.

There is some agricultural activity, and mining prospects are good. A railway now reaches from the southern part of the continent to the north coast, to the town of Darwin, the capital.

NORTH GERMAN CONFEDERATION, the union, in 1866, of the German states north of the Main, under the leadership of Prussia. When first organized it included eighteen states, later the number was increased to twenty-two. A constitution was adopted which was in the main that of the later German Empire. With the unification of Germany after the Franco-German War the confederation became merged in the larger organization. King William I was on the Prussian throne at the time of confederation; he became Emperor William I in 1871 when the Confederation was taken into the Empire.

NORTHMEN, or **NORSEMEN**, a name applied to the bold sea rovers who, in their small, sharp-prowed, open vessels, ravaged Great Britain and other parts of northern and western Europe from the eighth to the eleventh century. They were known to the inhabitants of the British Isles as Danes and Eastmen. To the inhabitants of the eastern coasts of the Baltic and the Mediterranean shores and of the Orkneys, the Hebrides and Northern France, where they made permanent settlements, they were known as Normans. They left colonies in the Faroe Islands and in Iceland, whence some of them went to Greenland (982). One of their navigators, Leif Ericson, according to legend, in 1002 visited the coast of New England. The Northmen called themselves *vikings*, and their leaders *sea-kings*. They were a vigorous race, fond of warlike adventure and worshippers of the gods Thor and Odin. The chief causes of their plundering expeditions were, no doubt, the crowded population and scarcity of food in their native homes, as well as their natural love of adventure.



NORTH POLAR EXPLORATION The region about the North Pole of the earth is a vast stretch of snow-covered lands and ice-bound seas, with the average temperature far below freezing point. That such a region has tempted explorers for centuries is a testimony to the courage and perseverance inherent in human nature.

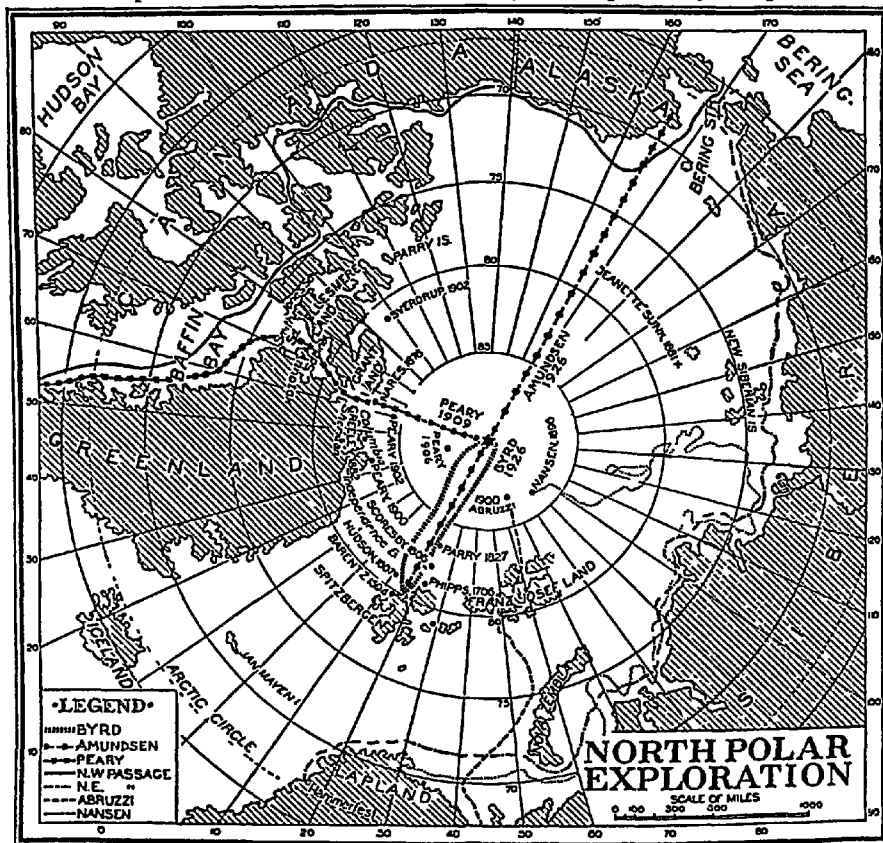
What called forth those expeditions to the frozen north, which have cost the lives of so many brave men? The earlier expeditions, undertaken soon after Columbus led the way to a New World, were inspired by commercial aims. Men were desirous of finding a new water route to India, and it was believed that a passage leading to Asia lay along the northern coast of North America. During the seventeenth century a new impetus was given to Arctic exploration through the interest in the seal and whale fisheries. Later, about the middle of the nineteenth century, interest shifted to scientific investigations, and ultimately the civilized world began to look forward to the discovery of the North Pole. The realization of that hope forms the great climax in the fascinating story of North Polar exploration. It was an American, Robert E. Peary, who found the Pole.

Peary's Expedition. Peary's discovery was the crowning achievement of nearly a quarter of a century spent in Arctic exploration. The expedition which resulted in his triumph left New York in the Steamer *Roosevelt* in July, 1908, and reached Etah, the most northerly inhabited point in Greenland, on August 8. Thence the *Roosevelt* went to Cape Sheridan, where it went into winter quarters September 5. The party began the dash for the Pole February 15, 1909, and the destination was reached April 6.

No other expedition for Arctic exploration had been so perfectly organized and completely equipped as this. It embodied the results of Commander Peary's long experience in the Polar regions, and practically provided for every contingency that might arise. While in winter quarters Peary hauled his supplies by sledges to Cape Columbia, whence the "dash to the Pole" was to start. The expedition left Cape Columbia in six

divisions, each a day apart, and at the start the outfit consisted of 7 white men, 19 Eskimos, 140 dogs and 23 sledges. As the march proceeded, these divisions returned to Cape Columbia from time to time until at last only one division remained. During the advance, igloos, or Eskimo huts, were built at each camp. These furnished the most

depth soon after leaving Cape Columbia. These soundings show the Arctic Ocean about the Pole to be 12,000 or more feet in depth. This discovery tends to dispel the idea previously current that this was a shallow ocean. It also points to a strong inference that there is no large body of land near the Pole; indeed, this has practically been proved.



desirable shelter for the men, and were in readiness for the party on their return march. With the exception of the drowning of Professor Marvin of Cornell, the entire expedition returned to the starting point without loss of life.

Besides reaching the Pole, the Peary expedition was able to add important data to the information previously gained about the Arctic regions. On his advance march Commander Peary took frequent soundings, and by these showed that the ocean increased in

On his other expeditions to the Arctic regions Peary explored and mapped the northern coast of Greenland and made extensive explorations of the Arctic Archipelago. On his return voyage in 1897 he brought from Cape York a meteorite which is the largest of its kind that has ever been discovered.

Cook's Expedition. Dr. Frederick A. Cook went with a party on a hunting expedition to north Greenland in July, 1907. The boat on which the party sailed was not constructed for navigating the polar seas, so

that Cook was obliged to winter at Annotok, a long distance south of Cape Columbia. From Dr. Cook's account it appears that during the winter he transferred his baggage to Ellesmere Land, whence he started for the Pole February 19, 1908. His route was to the west of Peary's and instead of returning by the same route, his return was still further west. The return trip was greatly prolonged by meeting spaces of open water, and the dangerous conditions of the ice, so that Dr. Cook and the few Eskimos who remained with him throughout the journey were compelled to pass the winter of 1908-1909 on the south shores of Jones' Sound. For this reason he was unable to send the news of his discovery at an earlier date. Dr. Cook landed in Copenhagen September 5, 1909, where he was received with high honors by the Danish government and the learned societies of the city.

The Controversy Dr. Cook was unknown as an Arctic explorer, neither was he known to be engaged in an expedition to the Pole. For these reasons his announcement was a great surprise to the world of science, and many geographers and learned societies withheld their acceptance of his statement until his records could be examined by competent authority. Dr. Cook submitted his record to the University of Copenhagen. After a most careful examination his records were not found to substantiate his claims. The matter, however, was not dropped with the verdict of the University, and further investigations showed that Cook's claim had no foundation in fact. Commander Peary submitted his records to the National Geographic Society at Washington. The Society approved the records, stating that they fully substantiated Peary's claims to the discovery of the Pole.

History Soon after the discovery of the New World, mariners believed that by sailing northward along the coast of North America a passage westward to Asia would be found, which would be much shorter than routes then used. The route from the Atlantic to the Pacific has always been known as the Northwest Passage, and before the middle of the nineteenth century more than 200 voyages had been attempted for its discovery. The English were the first explorers, beginning with John Cabot in 1497. He was followed by Sebastian Cabot, Frobisher, Davis and others, and in 1806 William Scoresby reached

latitude $81^{\circ} 30'$ north and added considerable to the previous knowledge of the coast of Greenland. Among early explorers sent out by the Dutch was Henry Hudson, an Englishman acting for a Dutch company, who explored Hudson Bay and surrounding waters in 1609 and 1610.

During the eighteenth century whaling vessels frequented the Arctic regions, and their commanders brought back considerable knowledge of those inhospitable shores. In 1845 an expedition under Sir John Franklin was sent out to discover the Northwest Passage. The entire company perished, and for more than ten years no trace of them was found. The desire to find, and, if possible, to relieve Franklin and his followers, led to numerous expeditions conducted by England and the United States.

Among the most celebrated commanders of expeditions for the relief of the Franklin party were Doctor Kane, of the United States, who gave the first popular and systematic account of the polar regions, and Hayes, who accompanied Kane and afterward conducted an expedition of his own, reaching latitude $81^{\circ} 35'$ north. He was followed by Hall, who reached latitude $82^{\circ} 16'$ in 1871, but died on his return. In 1875 Nares reached a point north of Grinnell Land, in latitude $83^{\circ} 20'$.

During 1882 and 1883 several stations were established by the United States and European nations, which cooperated with one another for the purpose of making a scientific study of the magnetic and climatic conditions of the region. The American station, under the command of A. W. Greely of the United States army, was located on the eastern coast of Grinnell Land and Lady Franklin Bay, $81^{\circ} 44'$ north. The station was maintained nearly two years, when the party retreated southward and was rescued in June, 1884. Only seven of the thirty-two men survived.

A sea route to the East by way of the Siberian ocean was also the goal of numerous explorers. This route is known as the Northeast Passage, and it was first navigated by the Swedish explorer Nils Nordenskjöld. He sailed from Sweden in 1878, passed through Bering Strait, and reached Japan in 1879. In 1915 a Russian explorer, Vilkitsky, successfully made the Northeast Passage by sailing westward from Bering Strait, reversing his predecessor's route.

The farthest point reached up to 1906, 86° 33', was attained by the expedition under the Duke of Abruzzi, in 1900. The commander accomplishing this feat was the Italian Cagni, of the Abruzzi party. The Northwest Passage by ship was traversed in 1905 by Captain Roald Amundsen in the sloop *Gjoa*, a small ship of forty-seven tons, propelled by a gasoline engine. Amundsen entered the Arctic Ocean through Davis Strait, went westward across Lancaster Sound, then southward and followed the coast to Bering Strait.

Arctic Exploration by Air. A new epoch in the history of Arctic exploration was inaugurated in May, 1926, when two successful trips to the North Pole were made by air—one on May 9, by Lieut. Richard E. Byrd, U. S. Navy, who flew to the Pole and back to his starting point at Spitsbergen in an airplane, with Floyd Bennett as pilot. His flight of about 1,500 miles was made in less than 16 hours. Two days later, the Amundsen-Ellsworth-Nobile expedition left Spitsbergen in a dirigible, the *Norge*, reached the Pole on May 12, and continued on to Teller, Alaska, thus being the first to cross the Arctic region from one hemisphere to the other.

On April 15, 1928, Capt. Geo. H. Wilkins and Lieut. Carl B. Eielson left Point Barrow, Alaska, in a monoplane, equipped with runners, and flew across the polar region north of Greenland to Spitsbergen, a flight of about 2,200 miles, in less than 21 hours.

Gen. Umberto Nobile, who had made the polar trip with Amundsen in 1926, organized a large expedition in 1928 for further exploration. His new dirigible airship, the *Italia*, carried 16 persons. After a preliminary flight over Franz Joseph Land to Lenin Land, the *Italia* set out for the Pole on May 22. On May 22, Gen. Nobile sent a wireless message stating he had passed over the Pole, and was returning to his base at Kings Bay. On May 25, the *Italia* was wrecked on ice floes. Nobile and several of his companions were deposited on the ice with wrecked apparatus and supplies, while the dirigible flew away with six men and was lost in the Arctic wastes. Nobile and seven others were subsequently rescued. Roald Amundsen, who had ventured in an airplane with five others to search for the wrecked explorers, disappeared into the North and he and his companions perished, attempting to save his missing friends.

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Northwest Passage
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NORTHROP, CYRUS (1834-1918), an American educator. He was born at Ridgefield, Conn., and was educated at Yale. In 1861 he became clerk of the Connecticut house of representatives and two years later of the senate. After this he was made professor of rhetoric and English literature at Yale and held this position until 1884, when he was elected president of the University of Minnesota, which position he filled for twenty-seven years with great credit.

NORTH SEA, a large branch of the Atlantic Ocean, lying between Great Britain and the Orkney and Shetland islands on the west and the European continent on the east. Its extreme length is 680 miles; its greatest breadth, 412 miles, and its area, about 200,000 square miles. The North Sea is deepest on the Norwegian side, where the depth is sometimes as great as 1,000 feet. The average depth of the southern part is about 100 feet, of the northern, 400 feet.

The tide is very irregular, owing to the fact that there is a tidal movement from the north and one from the south. Where the two waves meet there is a tidal rise of twenty feet. Rain, fogs and violent storms are frequent, navigation is dangerous. Because of the large body of fresh water constantly poured into it by the Elbe, Weser, Ems, Rhine, Meuse, Thames and Humber, the water of the North Sea is slightly less salty than that of the Atlantic.

The North Sea is one of the richest fishing grounds in the world. Not only do all nations bordering on it benefit from its fisheries, but distant countries send their vessels into its waters during the season, just as Europeans send their fishing smacks across the Atlantic for cod. The season begins earliest in the north, strange as it may seem, near the Shetland Islands, late in May, for the warm ocean current tempers the waters, progressively the season opens southward, and the traffic continues until November. Herring represent the largest catch, probably in no other equal area are as many herring taken, haddock and flatfish follow in importance.

NORTH STAR, the north polar star, the star α of the constellation Ursa Minor. It is close to the true pole, never "sets," and is therefore of great importance to navigators in the northern hemisphere. See **POLE STAR**.

NORTH TONAWANDA, *tahn a wahn'da*, N Y., in Niagara County, five miles north of Buffalo, on the Niagara River, the Tonawanda Creek opposite Tonawanda, on the Erie Canal and on the New York Central, the Erie and the Lehigh Valley railroads. It is a very important industrial center and contains extensive manufactures of various lumber products, steam pumps, pig iron, structural steel, office equipment, paper, musical instruments, rayon products, radiators and motor boats. The city has a Carnegie Library. Population, 1930, 19,019.

NORTHWEST BOUNDARY. Before the boundary of the United States and Canada west of the Rocky Mountains was permanently established there were years of diplomatic effort. In 1814 a commission established the international line from the Saint Lawrence River to the Lake of the Woods at the 49th parallel. The American commissioners desired that this parallel should mark the boundary to the Rocky Mountains, but the British members rejected the proposal.

After nearly thirty years of joint occupation by agreement agitation for settlement was carried into politics, and the cry, "Fifty-four-forty or fight," was a slogan of the Polk campaign for the Presidency. The British government was not disposed to relinquish its claim to the Columbia River, and proposed that from the mountains to the sea the line should be that river. In 1846 the permanent line was established by treaty. It was decreed that it should follow the 49th parallel to the middle of the channel separating Vancouver Island from the continent, then run south through the channel and through the center of the Strait of Juan de Fuca to the ocean. Both channel and strait were to be always open for free navigation by both nations.

NORTHWESTERN UNIVERSITY, an institution of higher learning located at Evanston, Ill., a suburb of Chicago, on the shore of Lake Michigan. It was chartered in 1851 under the auspices of the Methodist Episcopal Church, and is the largest educational institution under the management of that denomination. Until 1869 the only de-

partment was a college of liberal arts. There have since been added a graduate department, a college of engineering, a school of oratory and a school of music, all in Evanston, and schools of law, dentistry, medicine, pharmacy and commerce, in Chicago. Garrett Biblical Institute (on the university campus) and Norwegian-Danish and Swedish theological seminaries, in Evanston, are affiliated with the university. Magnificent new buildings for the law, commerce, medical and dental colleges have been erected in Chicago, on McKinlock Memorial Campus, at Chicago Avenue and Lake Shore Drive, near the shore of Lake Michigan.

The great university is the chief center of interest in the beautiful lake-shore city of Evanston, which was named for Dr. John Evans, head of the University corporation at the time of its organization. Northwestern has profited by many generous gifts, and has an endowment of over \$9,000,000. Its magnificent gymnasium building, one of the largest in the United States, was the gift of James A. Patten. Among other notable buildings are the men's dormitories, built on the quadrangle plan, and the Dearborn Astronomical Observatory. The libraries of the university possess nearly 700,000 volumes. There is a student enrollment of about 13,250, and the faculty numbers about 750.

NORTHWEST PASSAGE, the route from the Atlantic to the Pacific by way of the Arctic Ocean, along the north coast of North America. Navigators of the sixteenth century were seeking this passage in the effort to discover a shorter route to India, and the search was kept up at intervals until 1905, when Roald Amundsen, in the ship *Gjoa*, sailed from the Atlantic to the Pacific by way of Davis Strait, Lancaster Sound and Bering Strait. Half a century before this, however, Sir John Franklin's expedition found the historic passage, all of the company perished with the goal in sight. It is an interesting fact that after centuries of heroic endeavor to discover this northern route between the two oceans, the passage is never used as a commercial route. See **NORTH POLAR EXPLORATION**.

NORTH WEST TERRITORIES, a vast territory in Northern Canada, organized with present boundaries in 1912, to include the districts of Franklin, Mackenzie and Keewatin. With the exception of the Yukon and the great organized provinces, North West Territories

includes all of Canada, and has an area of 1,309,682 square miles. Before 1912, it contained 1,921,685 square miles, and in 1867, at the time of Confederation, over 2,600,000 square miles. The three units of the Territory are called Provisional Districts, they are vast in area, as follows: Franklin, 554,032 square miles, Mackenzie, 527,490 square miles, Keewatin, 228,160 square miles. Their present boundaries were established in 1920.

The North West Territories occupy the least valuable part of the Empire's Canadian possessions. The climate is cold, though the short summers are warm, the winters are long and very severe. From timber regions near the southern boundaries the vegetable life decreases to mosses and lichens in the Arctic zone. The population dropped from 18,481 in 1911 to 9,723 in 1931, owing to the loss of over 675,000 square miles of territory. The inhabitants are largely Indians and half-breeds, the few white people are mostly fur traders. See map, CANADA.

NORTHWEST TERRITORY, a name formerly given to the land lying between the Great Lakes, the Ohio River and the Mississippi River, including what is now Ohio, Indiana, Illinois, Michigan, Wisconsin and part of Minnesota. The larger part of this territory was claimed by Virginia, New York, Massachusetts and Connecticut, by reason of their charters and other grants. These claims long stood in the way of the adoption of the Articles of Confederation, since Maryland insisted that the territory should become a part of the United States before a new government was organized. Congress, therefore, promised in 1780 that the territory, when ceded to the United States, should be formed into new states on an equal footing with all the others, and the various states ceded their claims, Connecticut being the last, in 1786. Each, however, retained a small portion for its own special purposes. In March, 1784, a temporary government was established. This was superseded by the Ordinance of 1787. See **ORDINANCE OF 1787**.

NORTON, CHARLES ELIOT (1827-1908), an American author and art critic, born at Cambridge, Mass., and educated at Harvard University. After a brief experience in mercantile work, in the interest of which he made a trip to India and to Europe, he devoted his energy to scholarly pursuits. From 1864 to 1868 he was with James Russell Lowell, editor of the *North American Review*, and in

1875 he was appointed professor of the history of art in Harvard University and was made professor emeritus in 1900. Mr. Norton was one of the foremost representatives in America of higher culture, and he wrote and spoke frequently upon his favorite themes, literature and art. He edited the letters of a number of our prominent literary men, including those of Emerson, Lowell, George William Curtis, Carlyle and Ruskin. Among his published works are *The New Life of Dante*, *The Divine Comedy of Dante* and *Notes of Travel and Study in Italy*.



NORWAY, one of the three Scandinavian kingdoms, a long, narrow country extending more than 1,000 miles southward from the most northerly point of Europe. The kingdom of Norway is a monarchy in name, but is one of the most democratic countries in the world. Women enjoy the same political rights as men, and there are no titled classes. From 1814 to 1905 Norway and the neighboring kingdom of Sweden were united under the same king, but in the latter year the union, always distasteful to the independent, proud-spirited Norwegians, was dissolved. The people of Norway are universally respected for their honesty, thrift and love of democratic institutions.

Location and Size Norway occupies the western part of the Scandinavian peninsula, lying adjacent to Sweden, Finland (including Lapland) and the Russian government of Archangel. Its eastern frontier, which is about 1,500 miles in extent, follows the Swedish boundary for about 950 miles. Norway, extending 300 miles into the Arctic Zone, is a part of the "Land of the Midnight Sun," and its extreme northern tip, Cape Nordkyn, is the northernmost point of the European mainland. The Arctic Ocean washes the northern coast, the Atlantic and the North Sea the western. At the south is the Skagerrak, separating Jutland from Norway and connecting the Cattegat and the North Sea. The country has an area of about 124,643 square miles, a little greater than that of New Mexico, and about three times that of

Ohio. Sweden is the larger by over 48,000 square miles

People and Cities. The Norwegians exhibit two racial strains, represented by a tall, blond Teutonic type, and a shorter, darker one. The former predominates.

Typical Norwegians are tall, well built and athletic. They nearly all have fair skin, blue eyes and light hair in childhood, but the tendency is to grow darker in maturity. In activities that call for physical courage and endurance these people have always been conspicuous, and we find Norway well represented in the annals of polar exploration. No people on the globe command greater respect than the natives of this far northern land.

In 1930 the population of the country was 2,814,200. These figures show an increase above the statistics for 1920, although Norway has lost more people through emigration than any other European country except Ireland. The great majority of Norwegian emigrants have settled in the northwestern part of the United States, where they have quickly assimilated American customs and become loyal and valuable citizens. Of the total population, 18,300 are Lapps, and 7,250 are Finns. The Lapps live in the north, the bulk of the population is found in the south, and three-fourths of the inhabitants live under rural conditions.

On January 1, 1925, the name of Christiania, the capital, was changed to Oslo. At the census of 1930 it was credited with a population of 258,124. There were five cities whose population exceeded 25,000, the next largest being Bergen (98,303). Of all the people dwelling in the sixty-two towns or cities, about half are found in Oslo and Bergen.

Surface and Drainage. The coast of Norway is remarkable for its precipitous cliffs and the fiords which cut deeply into the shore in all directions. These fiords are submerged valleys bordered by high, steep cliffs, and are believed by geologists to be the result of glacial action. Although the length of a line drawn about the outer belt of the rocks of the Norwegian coast would be less than 2,000 miles, the total shore line of the country, including that of some of the larger islands, is about 12,000 miles, half the distance around the earth.

The surface of Norway is mountainous, particularly in the west and north, but the

mountains are not, generally, distinct chains, but huge plateaus or tablelands, from which the peaks rise singly or in groups. The highest point in the country and in the Scandinavian peninsula is the Galdhøpiggen (8,400 feet), in the Langfjeld Plateau. Immense snow fields and great glaciers descending from the plateaus are among the most distinctive features of Norwegian scenery. Hundreds of islands fringe the coast, the Lofoten group being the most important.

Owing to the narrowness of the greater part of the country, there are few rivers of importance. The only important streams which Norway can claim exclusively have a southeasterly direction and discharge into the Skagerrak. Of these the chief are the Glømsen, with its tributary, the Lougen, the Drammen, and the Skem. The slope of all these rivers is steep, and thus renders them unfit for navigation. The most important river in the north is the Tana, which, after forming part of the boundary between Norway and Russia, empties into the Arctic Ocean. Lofly waterfalls are numerous throughout the country, and there are scores of lakes, most of which are long and narrow. Four per cent of the surface of Norway is occupied by lakes and rivers, as compared to 0.5 per cent for all of Europe.

Climate. The climate of Norway is, on the whole, severe, but not unbrokenly so, as might be expected. The great extent of the seacoast and the large amount of water within the country have a moderating effect on the climate. On the west coast mild winters and cool summers are the rule, but in the interior the winters are very severe. Far to the south the summer days are long and sunny, but on the shortest day of the year the sun is visible less than six hours. In the north there are two months of winter darkness, as in other Arctic regions. On the western coast, where the rainfall is greatest, precipitation ranges from fifty to eighty inches annually, and at some points it reaches a maximum of ninety to ninety-two inches. On the southeast coast it is about forty-eight inches, while on parts of the plateau the average is only twelve inches.

Mineral Resources. Norway has deposits of silver, copper, pyrites and iron, and all of these minerals are mined to a limited extent. Feldspar and nickel ore are also worked, and marble, building stone, roofing slate and soapstone are produced in suffi-

ment quantities to permit their export. Only on a remote island is there any coal. The mining establishments give employment to about 8,000 persons, and there are about a dozen smelting furnaces in operation.

Fisheries. The fisheries provide a livelihood for over 116,000 persons, and fishing is one of the oldest industries of the country. Codfish is the most important catch, the value of a year's haul has reached as high as \$20,000,000. Large quantities are sold fresh for the domestic trade, and a great deal of salted fish and of cod-liver oil is exported. Second in importance to cod is herring, with mackerel, salmon, sea trout and lobsters following. The whale, seal, walrus and shark fisheries are also exploited.

Agriculture. The rugged country of the Norwegians can by no means supply the people with sufficient food. Only one-thirtieth of the whole area is under cultivation, and nearly one-fourth is covered with forests. The highland pastures and barren mountains constitute the remainder of the surface. A list of the commodities requested of the allies in 1918, when the Norwegian government was negotiating for the import of necessities, indicates the needs of the country, the list included bread grains, rice, cocoa, syrup, sugar, fruit (dried and fresh), pork and beef, sances and pickles. Of the crops raised by the Norwegian farmer, oats is the most important, over 230,000 acres being devoted to this cereal. Potatoes are raised in large quantities, having an acreage of about 125,000. Barley and rye are harvested in limited areas in the north, and wheat in the south. Other crops are hay and mixed corn.

Farming is carried on vigorously and modern implements are used. The farms are generally the property of those who cultivate them, and commonly include a large stretch of mountain pasture, often forty or fifty miles from the main farm, to which the cattle are sent for several months in the summer. The rearing of cattle is an extensive and profitable industry. The horses are vigorous and sure-footed, but some of them are of diminutive size. In the north many herds of reindeer are kept, and they constitute the chief wealth of many of the inhabitants of that region. The dairy products of Norway are excellent and are exported to some extent.

Manufactures. The leading manufacturing industry is the making of lumber products. The greatest forests are of pine, but

fine forests of oak are found in the south, and birch forests grow farther north. Timber and lumber constitute about one-third of the total exports of the country. The other lines of manufactures include paper making, distilling, shipbuilding and the manufacture of chemicals, clothing, machinery and metal work, textiles, bone and horn. Though the manufacturing activities show a steady increase, Norway as yet has to import large quantities of manufactured articles.

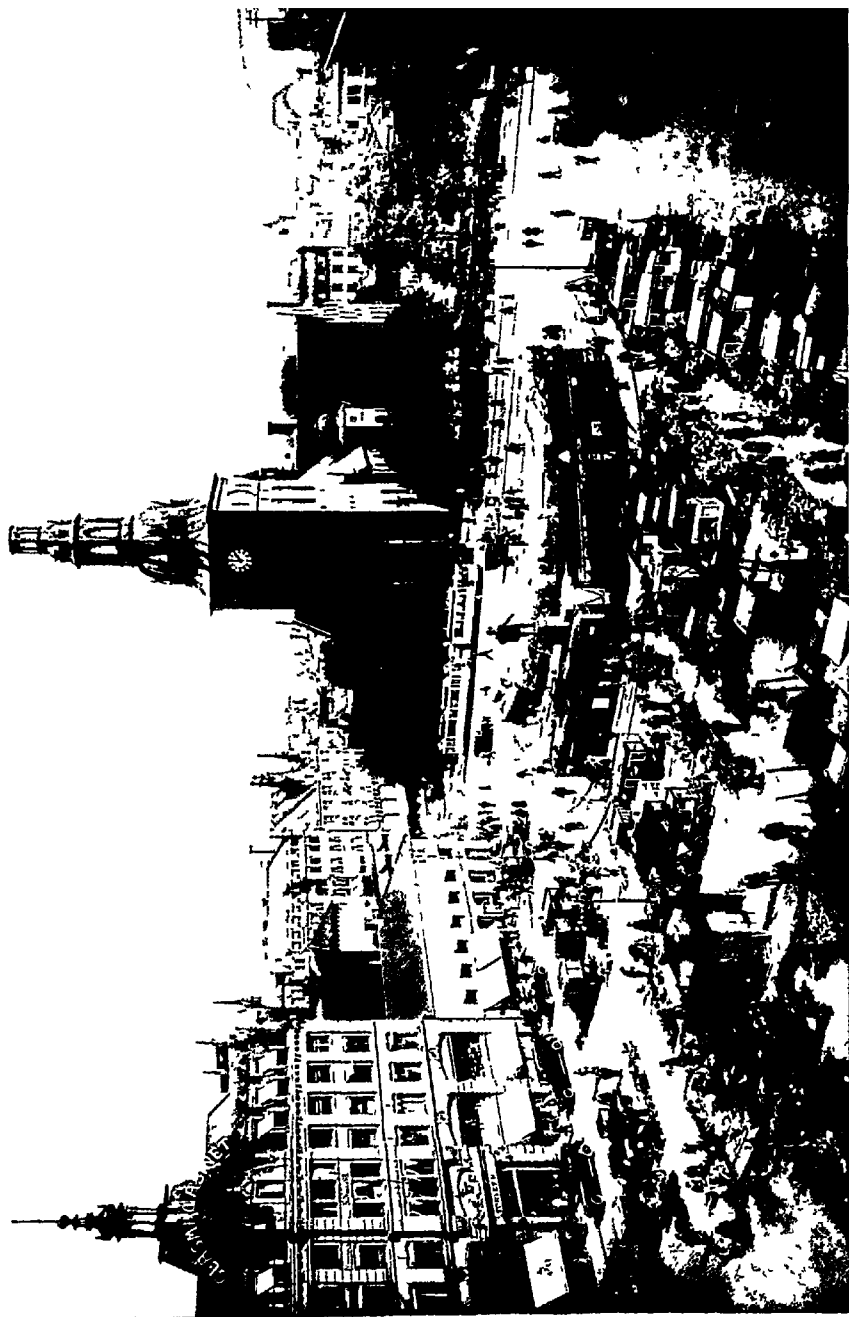
Commerce and Transportation. The Norwegians are famous sailors. Before the World War the country possessed the largest merchant marine, in proportion to its population, in the world, during the war Norway suffered great losses through submarine attacks, but the former tonnage was restored speedily. A large part of the trade consists in the transportation of freight for foreign nations. The imports of the country far exceed the exports, but the revenue from the carrying trade makes up the deficiency. Bergen, Oslo, and Trondheim are the principal ports.

In the country there are many excellent highways and about 2,400 miles of steam railway. Electric power has been installed on 150 miles of railroad.

Education. School attendance is compulsory, the school age in towns being six and a half to fourteen. In the country the beginning age is seven. Of secondary schools there are about seventeen public, eighty-nine communal and eleven private, most of them being coeducational. The state maintains ten normal schools, and there are four private institutions of this class. The only university, the Royal Frederick, is at Oslo. The government makes ample provision for the care of deaf, blind, feeble-minded and neglected children.

Language and Literature. For several centuries Danish (Dano-Norwegian) has been the literary and commercial language of the kingdom, but certain dialects, resembling Icelandic or Swedish, are also spoken. *Landsmaal*, based on existing Norwegian dialects, is attracting much interest. It is a written language originated by Ivar Aasen. Efforts are being made to have it recognized by the government as the official language of Norway.

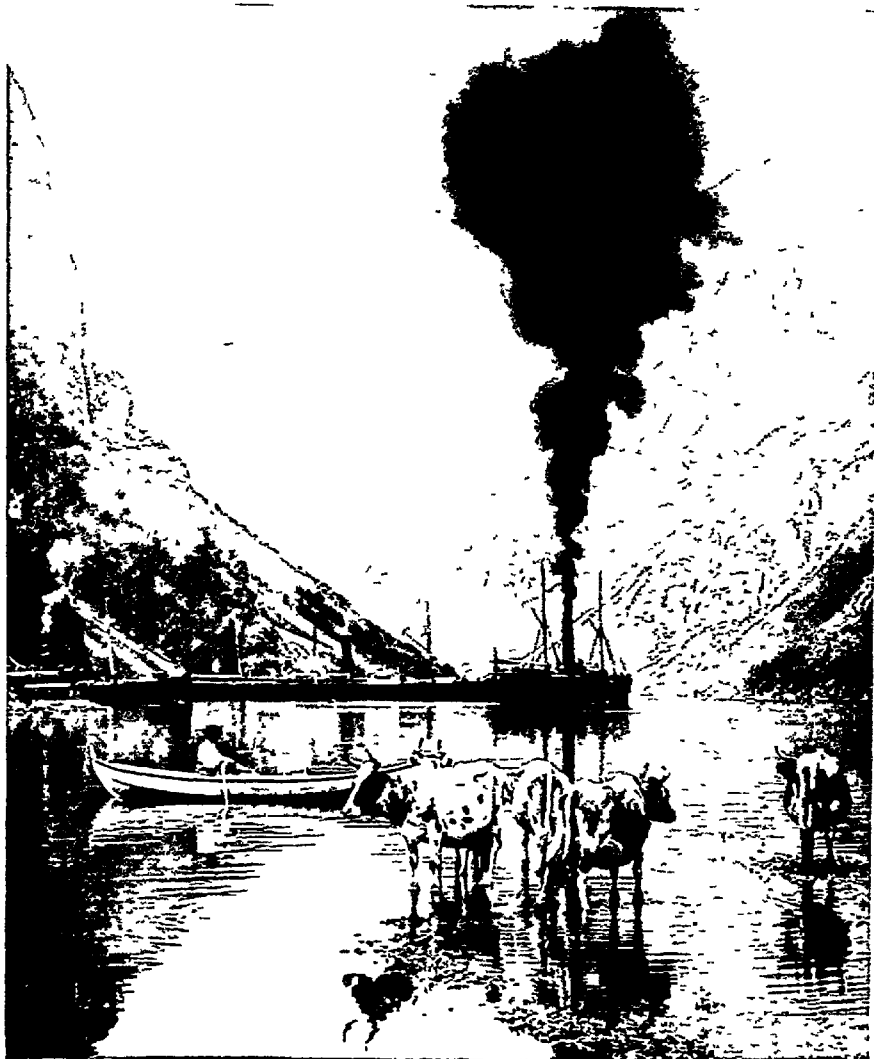
The producers of the first literature of Norway were the *skalds*, who are known to have composed songs and poems as early



Travel Magazine

IN OSLO, CAPITAL OF NORWAY

There was an Oslo here in 1048, but the settlement was several times destroyed and rebuilt. The present city dates from 1624, it was called Christiana until 1925, when its ancient name was restored.



Pacific & Atlantic

NAEROFJORD, NORWAY

A characteristic scene on the coast of Norway. Very steep walls inclose the fjord. This is a fine example of a submerged coast.

as the ninth century. These oldest *sagas*, while they do not exist in their original form, have in some instances been incorporated in the *Snorra Edda*, and so preserved. The *Elder Edda*, probably composed between the ninth and the eleventh centuries, owed much to Norwegian composers. From the fourteenth century, the date of the union with Denmark, to 1814, the time of the separation from the latter kingdom, Norway had no national literature, its literary history being identical with that of Denmark. As was natural, the first productions after the separation were patriotic songs. The first great national poet was Henrik Wergeland (1808-1845), whose greatest poem is *The English Pilot*. Among others who flourished during the middle of the nineteenth century may be mentioned Johan Sebastian Welhaven (1807-1873), Peter Christen Asbjørnsen and Jørgen Moe. It was Asbjørnsen and Moe who brought to the notice of the world much of the native material contained in the old folk songs and popular poetry.

The greatest figures in Norwegian literature of the nineteenth century are Ibsen and Bjørnson, dramatist and novelist; Jonas Lie, the author of popular sea stories, and Alexander Kielland, the novelist, were other famous writers of the century. There is at present great activity in many different lines of literary effort.

Government and Religion. Norway is a constitutional, hereditary monarchy. The king is assisted by a Council of State, or Cabinet, the members of which are heads of departments. The legislative power is vested in a parliament, or *Storting*, which is elected every three years. The *Storting* divides itself into two chambers, the *Lagting*, consisting of one-fourth of the members, and the *Odelsting*. All bills must originate in the latter chamber. Universal suffrage exists. There are no titles of nobility under the Norwegian government.

The great body of the people belong to the Evangelical Lutheran Church, which is the established national Church. Complete religious freedom prevails, and Norway is reputed to be the most Christian country in Europe. The Methodists and Baptists have the largest number of adherents outside the established Church.

History. It is not until the ninth century that the historical period in Norway begins. In 872 the numerous small king-

doms, which had been divided and ruled over by the petty chiefs, or *jarls*, were united under Harold I. During this century and that which followed Viking expeditions were common, and through intercourse with more civilized parts of Europe, Norway received Christianity. The country reached its height as an independent power under Haakon the Old (1217-1263), and it was during this century, too, that permanent colonies in Iceland and Greenland were founded by Norse adventurers. The grandson of Haakon the Old, who died in 1319, was the last Norwegian king of Norway. Magnus Smek was at his accession king of Norway and Sweden, but in 1355 Norway became nominally independent, with Haakon VI, son of Magnus, as ruler. Haakon married the Danish princess Margaret, who on the death of her husband and son became ruler of both Norway and Denmark. In 1397, by the Union of Kalmar, Margaret brought Sweden also under her sovereignty.

Sweden became independent in the sixteenth century, but Denmark and Norway remained under one rule until 1814. Norway declined in prosperity and importance after the middle of the fourteenth century, when the Black Death ravaged the country and greatly reduced the population. The union with Denmark, too, was far from beneficial to the country, as the kings regarded Denmark as the more important country and treated Norway merely as a province. The long union with Denmark was ended by the Napoleonic struggle, for Sweden demanded Norway as the price of its aid to the allies against Napoleon. Norway was taken from Denmark as a punishment for the adherence of the latter kingdom to Napoleon. The Norwegians refused, however, to agree to the Treaty of Kiel (January, 1814), which ceded the country to Sweden, declared their independence and adopted a free constitution. Bernadotte, the crown prince of Sweden, entered Norway with an army, and although he was not completely successful, the pressure which the other powers brought to bear compelled Norway to accept the Swedish proposals for union, by which the former was allowed to retain its own constitution.

Throughout the nineteenth century Norway constantly resisted all attempts of Sweden to lessen in any way its constitutional rights. The feeling that Sweden, as the

larger country, was in every way considered more than Norway, kept dissatisfaction alive throughout the country, and when, in 1905, King Oscar of Sweden refused the demand of the Storting, the Norwegian parliament, for a separate consular service, this refusal was made the occasion for declaring the independence of the country. As a proof that the separation was a friendly one, the Storting invited King Oscar to name one of his sons as king of Norway. Sweden was obliged to submit to the separation, which was arranged in the Treaty of Karlstad, concluded in September, 1905, but Oscar refused to accept the crown for his son, and Charles, brother of Christian X, of Denmark, was chosen ruler, taking the name of Haakon VII. Norway was the first European nation to grant suffrage to women on the same terms as men, local suffrage was granted them in 1901, and parliamentary suffrage in 1907.

During the World War Norway suffered the same privations that were the lot of the other neutrals, but its losses from submarine attacks were much heavier than those of Sweden and Denmark; 831 ships had been sunk and 1,020 lives lost. A commercial war with Spain and Portugal resulted from a prohibition law in Norway which shut out wine from those countries, which had previously been freely exchanged for fish. Prohibition was voted down, and in 1926 liquor became a state monopoly. In 1929 political ties were strengthened by the marriage of Crown Prince Olaf to Princess Martha of Sweden.

Related Articles Consult the following titles for additional information

GEOGRAPHY

Amundsen, Roald	Ibsen, Henrik
Bergen	Mäkelström
Björnson Bjornstjerne	Nansen, Fridtjof
Christiania	Northmen
Denmark,	North Polar Explora-
subhead History	tion
Edda	Sagas
Fjord	Skagerrak
Haakon VII	Skalde
Hammerfest	Sweden,
Harold	subhead History
	World War

NORWICH, CONN., one of the county seats of New London County, (New London being the other), fifty miles southeast of Hartford, on the Thames River, at the head of navigation, and on the Central Vermont and the New York, New Haven & Hartford railroads. The city is picturesquely located among the hills and has many fine residences, well-shaded streets and several public parks. It has excellent water power and contains

extensive manufactories of clothing, cotton, velvet, silk, stoves, vacuum bottles, and a variety of machinery. Here is located a state hospital for the insane, and a sanitarium for tubercular patients. The city also has a hospital, Otis Library, a Y M C A building and the Free Academy, in connection with which is an art museum. Saint Patrick's church and the courthouse are also notable structures. The place was settled in 1659 and was chartered as a city in 1784. Benedict Arnold was born here. Population, 1920, 22,304, in 1930, 23,021.

NORWICH, nor'rich, or nor'rij, ENGLAND, on the Wensum River, 114 miles northeast of London. It is noted for many old buildings, a number of which were constructed during the Middle Ages; some of the ancient gates and fortifications still remain. In the center of the city is an old Norman castle, built at about the close of the eleventh century. There is also a cathedral, noted for its great age and lofty spire, one of the highest in England; it was dedicated in 1101. Years ago Norwich became the center of an important textile industry, which has declined. There are also manufactures of agricultural implements, machinery, shoes, mustard and starch. Dyeing and distilling are of considerable importance. Population, 1931, 126,207.

NORWOOD, OHIO, a suburb of Cincinnati on the northeast, on the Baltimore & Ohio Southwestern, the Pennsylvania, and Norfolk & Western railroads. There are manufacturing establishments which produce most of America's playing cards, and bookcases, electrical apparatus, pianos, machinery and tools. The place was settled about 1790 and was incorporated as a city in 1902. Population, 1920, 24,966, in 1930, 33,411, a gain of 33.8 per cent.

NOSE, that part of the breathing apparatus through which the air enters the lungs, also, the organ of smell. In most animals, the nose is the most prominent feature of the face. In some of the lower animals, as the dog, it forms the muzzle, and in others, like the hog, tapir and elephant, it is prolonged into a proboscis.

The nose in man is a triangular pyramid, with a framework of bone and cartilage. The bony portion of the framework consists of the nasal bones, the vomer and the turbinate bone. The cartilage is attached to the vomer, completing the partition between the nos-

trils, and to the nasal bones, completing the framework at the sides. The nose contains front and back passages, known as the *nares*. The front pair form the *nostrils*, through which the air enters. These passages are lined with a mucous membrane, in which, in the upper part of the nostrils, the fibers of the *olfactory nerve* (nerve of smell) are distributed. Inflammation of this membrane causes the symptoms of "cold in the head." Since such inflammation blocks the way to the center of smell, that sense is deadened when one has a cold.

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Catarth	Smell

NOTARY PUBLIC, in the United States and Great Britain a person authorized to attest or certify legal documents and to perform certain other official acts. In the United States a notary is usually appointed by the governor of his state, and his jurisdiction does not extend beyond the county for which he is appointed. In most states a notary takes an oath of office and gives bond as security for proper performance of his official duty. In general the powers of a notary are to take acknowledgment of deeds, mortgages and bills of sale and other such legal documents, to protest commercial paper and to take depositions and affidavits.

NOTATION AND NUMERATION. See ARITHMETIC, ALGEBRA.

NOTES, in commerce. See PROMISSORY NOTE; NEGOTIABLE PAPER.

NOTRE DAME, *not' dam*, CATHEDRAL OF, a famous Roman Catholic church in Paris, situated on an island in the Seine. The foundations of the building were laid in 1163, and certain parts of it were not completed until the last part of the thirteenth century. Victor Hugo's *Notre Dame de Paris*, written in 1830, led to a complete restoration of the edifice. The architectural style is Gothic. Characteristic features are the two massive towers on the west front and the heavy flying buttresses which support the roof. It was intended to surmount the towers with lofty spires, but these were never erected. From 1182 to the present Notre Dame has been the scene of the most important ceremonies of Church and state in France.

NOTRE DAME, UNIVERSITY OF, a Roman Catholic institution, established at Notre Dame, Ind., in 1842, by the head of the Congregation of the Holy Cross. The university

maintains a college of arts and letters, colleges of science, engineering, architecture and law, and a preparatory school. All students belonging to the junior college year may take military drill. The institution is particularly well equipped for work in applied science, and its science building and furnishings are valued at \$500,000. There are several schools for brothers, novices and young priests, affiliated with the university. It also has several preparatory schools in different parts of the country. The faculty numbers more than 200, and the enrollment exceeds 2,700. The library contains 103,000 volumes. A new stadium, one of the largest in America, has been erected.

NOTTINGHAM, *not'ing am*, ENGLAND, a manufacturing city in the County of Nottingham, on the River Trent, 125 miles northwest of London. It is noted as a center of lace manufacture. The most important buildings are the Nottingham castle, which is now an important art museum, the exchange, the postoffice and the townhall. The city is the seat of Nottingham University College. It also contains a mechanics' institute and school of art and has a public library of over 100,000 volumes. Hospitals, churches, parks and charitable institutions are numerous. Besides lace manufacture, the city's industries include the spinning of wool, cotton and silk, the making of hosiery, and the manufacture of chemicals, foundry products and machinery. The county is celebrated in literature as the scene of a good many of the adventures of Robin Hood. Population, 1931, 268,800, estimated in 1933, 253,000.

NOUN, *noun*, in grammar, a word that names any object about which a statement can be made. A noun is called *proper* when it is the name of an individual person or thing, as, *Mary*, *America*, *common*, when it is the name of a class of objects, as *book*, *chair*; *collective*, when in the singular it names a collection of similar objects, as *herd*, *flock*, *concrete*, when it names material objects; *abstract*, when it names a quality, condition or action, as *hardness*, *bravery*. (See the Seventh Year and Eighth Year sections of the article LANGUAGE AND GRAMMAR, for suggestions on the study of the noun.)

NOVAACULITE, *no vak'u lite*, in geology a very finely-grained quartz. In America it occurs in its most perfect form only in Arkansas, and that state supplies it for the making of whetstones and hones.



NOVA SCOTIA, *no'vah sko'shah*, one of Canada's maritime provinces, is the smallest member of the Dominion, excepting Prince Edward Island. It comprises a peninsula, joined to the southeastern corner of New Brunswick, and a large island called Cape Breton. On the south lies the Atlantic Ocean, on the north, the Bay of Fundy and the Gulf of St. Lawrence. The area of the province is 21,428 square miles, of which Cape Breton Island contains one-seventh.

The population in 1931 was 512,846. For facts on Cape Breton Island, see that title.

Surface, Drainage, and Wild Life. In general, Nova Scotia consists of low land, sloping gradually to the southwest. Two parallel lines of hills, known as the North and South mountains, skirt the Bay of Fundy shore, and between them lies the fertile Annapolis Valley. They reappear north of Minas Basin as the Cobequid Mountains. They are a northern extension of the Appalachian system, but their highest peak is barely 1,100 feet. Cape Breton is much more rugged, with mountains ranging from 1,200 to 1,500 feet high.

The rivers are small but numerous, and teem with salmon, trout, and other fish. There are innumerable lakes, the haunt of wild fowl. The beautiful Bras d'Or lakes of Cape Breton are salt, being really an arm of the sea. Over half the land surface of the province is in a state of nature, its bush, barrens, and bogs being the home of the moose, deer, bear, partridge, and woodcock.

Climate. Being nearly surrounded by water, Nova Scotia has fewer sudden changes and extremes of temperature than has the mainland of the continent. The winters are moderate, and the summers mild and equable, the highest temperature at Halifax seldom exceeding 86°. The annual rainfall is about 45 inches.

Mineral Resources. Nova Scotia possesses some of the most valuable bituminous coal deposits in North America, covering 725 square miles. The chief market for the product is the central provinces. Gypsum, clay

products, building stone, and salt are also mined. The presence of coal and limestone in Cape Breton, and the near proximity of the iron mines of Newfoundland, make Sydney an ideal center for the manufacture of steel. Gold is found in comparatively small quantities over a large area.

Agriculture. The lowlands along the streams, and the dykelands in the northwest of the peninsula, are specially fertile, and the equable climate and abundant moisture adapt Nova Scotia to the raising of hay, grains, root crops, and fruits, all of which are produced in large quantities. Among the cereals, oats, barley, and wheat are the most important. Potatoes are extensively grown and are among the finest that Canada produces. The river valleys in the southern half of the peninsula are specially well suited to the raising of fruit, and apples are grown and exported in large quantities. Strawberries and blueberries are also important exports. Stock raising is a standard industry, and considerable quantities of butter and cheese are made. The rearing of the silver fox for its pelt, a recent development, is important.

Other Industries. The fisheries of the province are surpassed in the entire Dominion only by those of British Columbia, and they give employment to a large number of people. Cod and lobsters head the list, the Nova Scotian lobster fishery being the largest in the world. Among other commercial fish taken in large numbers are herring, halibut, mackerel, salmon, and swordfish. Tuna-fishing is rapidly becoming an attraction for sportsmen.

Manufacturing is gradually assuming considerable proportions, rivaling agriculture in annual value. These two, and mining, are the three main industries of the province in point of value of product. Lumber is manufactured to some extent, but the main product of the forest is pulp-wood. The chief manufacturing industries include iron and steel, fish-curing, saw mills, biscuits and confectionery, electric light and power, butter and cheese, hosiery and knit goods, and ship-building and repairs.

Transportation. Its extensive coast line and numerous harbours give Nova Scotia excellent facilities for communication by sea. Shelburne and Halifax in the peninsula, and Louisburg and Sydney on the island, have four of the finest natural harbours in the world. Halifax, the chief seaport, has regu-

lar steamship connection with European ports, as well as with those of Canada and the United States. The Canadian National Railway extends from the New Brunswick border to Halifax, with branches to Sydney and, along the south shore, to Yarmouth. The Canadian Pacific Railway serves the Bay of Fundy counties. Altogether, there are about 1,900 miles of railway in operation in the province.

Education. The public schools are in charge of a Council of Public Instruction, consisting of the members of the government. A Superintendent of Education is the chief executive officer. The schools are undenominational, and uniform throughout the province as to courses of study and grading. Every county has one or more high schools. Teachers are trained at the Normal College at Truro and at some of the universities. The technical College at Halifax is provincially controlled. The other colleges are independent. Among them the following should be mentioned:

Dalhousie University (undenominational), with which is federated King's University (Anglican), Halifax.

Acadia University (Baptist), Wolfville.

University of St. Francis Xavier (Roman Catholic), Antigonish.

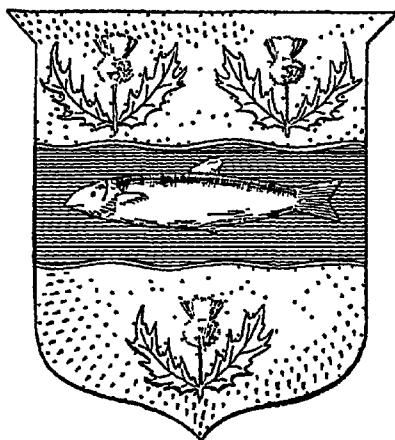
Government and Religion. The legislature consists of one chamber (a House of Assembly), and the executive authority is vested in the cabinet. A Lieutenant-Governor represents the sovereign. For local administration the province is divided into municipalities, which in most cases are coterminous with the counties.

Nearly four-fifths of the population is of British, and over one-tenth of French, descent. About two-thirds of the inhabitants are Protestants, mostly United Church, Anglican, Baptist, and Presbyterian, and one-third are Roman Catholics.

Towns. There are two cities: Halifax, the capital, in the peninsula, ranking thirteenth in size among the cities of Canada, and Sydney, in Cape Breton. The four largest towns are Glace Bay, Dartmouth, New Glasgow, and Truro. Yarmouth is the chief port of entry for shipping from the United States.

History. Nova Scotia was discovered by John Cabot in 1497, but was not colonized by Europeans till 1605, when the French

founded Port Royal, near Annapolis. They called the country Acadie, or Acadia. For over a century the province suffered from the frequent wars between Great Britain and France, until, in 1713, it was ceded to the former. The first British settlement was Halifax, founded in 1749. In 1755 about half of the Acadian French were deported, owing to their hostility to the British, and on this incident the poem of *Evangeline* was based. In 1763 Cape Breton was annexed to Nova Scotia, but it was separated between 1784



COAT OF ARMS OF NOVA SCOTIA

Some years ago the government of Nova Scotia, with the sanction of the College of Heralds, adopted as the Achievement of Arms for the province that granted by King James I to Sir William Alexander, the founder of the Scottish settlement at Port Royal early in the seventeenth century. A representation of it is given above. The 'supporters' are the royal unicorn and a native American Indian.

and 1820. The great influx of Loyalists into the Maritime Provinces after the Revolutionary War led to the erection of New Brunswick and Prince Edward Island as separate provinces.

Responsible government was achieved about 1848, and the system of free schools was established in 1864. In 1867 the province became a member of the dominion of Canada. In 1917, during the World War, the terrific explosion of a munitions ship in Halifax Harbour killed more than 1,200 people, injured about 4,000, and destroyed the north end of the city. In 1926 the Legislative Council was abolished.

Items of Interest on Nova Scotia

The isthmus connecting Nova Scotia and New Brunswick is eleven and a half miles wide

In Cobequid Bay, the eastern end of Minas Basin, the tide rises as high as 53 feet On the south coast it seldom exceeds 7 feet

The innumerable and beautiful lakes are a marked feature of the scenery

There is much variety of game, including moose, deer, wild geese and ducks, partridge, woodcock, snipe, and plover The game laws are well enforced Bears, foxes, wildcats, beavers, and otters are fairly common, but wolves are now extinct.

In the early 1880's Nova Scotia had the largest shipping tonnage in the world, in proportion to its population

There are wireless telegraph stations at Sable Island, Glace Bay, Halifax, and Cape Sable

The density of population is greater than that of any other province except Prince Edward Island

The most densely populated rural district in Nova Scotia is on the Bay of Fundy shore, where a continuous succession of French Acadian parishes appear as one village forty miles long

Both the earliest French and the earliest British settlement in Canada were made in Nova Scotia (Port Royal, 1605, Halifax, 1749)

The first legislative assembly in what is now Canada met at Halifax in 1758

Questions on Nova Scotia

How big is Nova Scotia, compared with your own province or state?

What large island forms a part of the province?

What term is sometimes applied to Sable Island? Why?

What kinds of game are found?

How do the fisheries of Nova Scotia rank? Name the two chief commercial fish Name three game fish

What is Nova Scotia's chief mineral?

How does its output compare with that of other provinces?

What are the principal colleges?

Related Articles Consult the following titles for additional information

Acadia	Grand Pre
Canada, Dominion of	Halifax
Cape Breton Island	Sydney
Evangeline	Yarmouth

NOVA ZEM'BLA, two large islands in the Arctic Ocean, belonging to Russia and lying north of the northeastern corner of European Russia The two are separated from the mainland of Russia by Kara Strait The total area of the two islands is about 35,150 square miles The coasts swarm with seals, fish and water fowl The interior is covered with stunted shrubs, short grass and moss, and the animals include bears, wolves, foxes, reindeer, ermines and other fur-bearing animals The islands are almost uninhabited, but Russian hunters and fishers visit them constantly, and in the years to come they will become increasingly important, notwithstanding their Arctic location

NOVEL, a form of prose narrative that has enjoyed uninterrupted popularity for about two centuries Thousands of novels are published every year, but there seems to be no lessening of the popular taste for them While not all that leave the press possess worth, the novel has been the favorite form of writing for some of the greatest men and women of literary history, and it must be regarded as one of the most important forms of literature And yearly fiction is growing in popularity

What is a Novel? There are certain requirements that distinguish this class of fiction While there is no definite limit as to extent, it is generally agreed that the novel is an extended narrative, distinguished in this respect from the short story A novel, too, has a plot, though authors like Dickens and Thackeray took great liberties with this requirement Their novels are so involved and loosely constructed that it would be difficult to summarize the story of any of them briefly Yet in each there is a continuous thread of narrative, even if many other threads cross it and are themselves interwoven

The novel also presents types of character in a truthful way It deals with people as they are in everyday life, not as fairies or gods There is a type of fiction, called the *romance*, in which the characters and situations are so mysterious and unreal that the story lacks the element of reality The line between these two types is not always

well marked, as in the case of the stories of Sir Walter Scott. His books are often called romantic novels, or historical romances. They have an air of reality, and a background of historic fact, but they are much more adventurous and imaginative than the ordinary character novel. They take the reader away from the matter-of-fact world and give him a glimpse of the world of knighthood and chivalry.

Some critics insist also on another requirement, the love element. Such critics refuse to call Defoe's *Robinson Crusoe* a novel in the strict sense of the term, because it lacks that element. The first English work of fiction that possessed all of the qualifications of the modern novel was Richardson's *Pamela*, published in 1740.

Related Articles The reader will find in the article *Fiction* an extended discussion of different types of the novel, and a list of fourteen standard novels. For other information connected with this subject consult the following titles

GENERAL

Literature

Romance

AMERICAN NOVELISTS

Alcott, Louisa May
Adams, William T.
Alden, Isabella M.
Aldrich, Thomas B.
Allen, James Lane
Atherton, Gertrude
Bacheller, Irving
Bacon, Josephine D.
Barr, Amelia E.
Beach, Rex
Brady, Cyrus T.
Burnett, Frances E.
Cable, George W.
Chambers, Robert
Chester, George R.
Churchill, Winston
Clemens, Samuel L.
Cooper, James F.
Crane, Stephen
Crawford, F. Marion
Davis, Rebecca H.
Davis, Richard H.
Deland, Margaretta
Dixon, Thomas J.
Eggleston, Edward
Ford, Paul Leicester
Fox, John, Jr.
Freeman, Mary E.
French, Alice
Garland, Hamlin
Harris, Joel Chandler
Harte, Francis Bret
Hawthorne, Nathaniel
Herrick, Robert W.
Holland, John G.
Holmes, Oliver W.

CANADIAN NOVELISTS

Barr, Robert
Cotes, Sara Jeannette
Duncan, Norman
Gordon, Charles W.
Halliburton, Thomas C.
Lighthall, William D.

ENGLISH NOVELISTS

Austen, Jane
Barrie, Sir James
Bennett, Arnold
Besant, Sir Walter
Black, William
Blackmore, Richard D.
Bronte, Charlotte

Howells, William Dean
Jackson, Helen Hunt
James, Henry
Johnston, Mary
Landon, Jack
Lorimer, George H.
McCutcheon, George B.
Mitchell, Silas Weir
Morris, Gouverneur
Murrefe, Mary N.
Nicholson, Meredith
Page, Thomas Nelson
Porter, William Sydney
Rice, Alice Hegar
Riggs, Kate D.
Rinehart, Mary R.
Rives, Amélie
Roe, Edward P.
Rohlf, Anna K.
Sinclair, Upton
Smith, Francis H.
Stockton, Francis R.
Stowe, Harriet B.
Tarkington, Newton B.
Terhune, Mary V.
Thompson, James M.
Thompson, John T.
Wallace, Lewis
Ward, Elizabeth S.
Wharton, Edith
White, Stewart
Edward
Whitney, Adeline D. T.
Wister, Owen
Wright, Harold Bell

NOVELISTS

Parker, Sir Gilbert
Roberts, Charles G. D.
Saunders, Margaret M.
Seton, Ernest
Thompson
Trail, Catherine P.

NOVELISTS

Bulwer-Lytton, Edward
Bunyan, John
Bysshe (Thomas) Hall
Chester, Gilbert K.
Collins (William) Wilkie

Corelli, Marie
Cralk, Dinah M.
Defoe, Daniel
Dickens, Charles
Disraeli, Benjamin
Doyle, Sir Arthur C.
Ebers, George M.
Elliot, George
Fielding, Henry
Galsworthy, John
Gasquet, Elizabeth C.
Goldsmith, Oliver
Haggard, Sir Henry R.
Hardy, Thomas
Harraden, Beatrice
Henty, George Alfred
Hewlett, Maurice H.

Hughes, Thomas
Kingsley, Charles
Kipling, Rudyard
Lever, Charles James
Marryat, Frederick
Meredith, George
Reade, Charles
Richardson, Samuel
Scott, Sir Walter
Sterne, Laurence
Stevenson, Robert L.
Thackeray, William
Trollope, Anthony
Ward, Mrs. Humphry
Watson, John
Wells, Herbert G.

OTHER NATIONS

Andersen, Hans
Annunzio, Gabrielle d'
Balzac, Honoré de
Björnson, Björnstjerne
Bourget, Paul
Cervantes, Saavedra, Miguel de
Daudet, Alphonse
Dumas, Alexandre
Du Maurier, George L.
Gorky, Maxim
Heyse, Paul
Hugo, Victor, Marie
Lagerlöf, Selma
Lesaage, Alain René
Maartens, Maarten
Maupassant, Henri Guy
Mérimée, Prosper
Sand, George
Sienkiewicz, Henryk
Tolstoy, Lyoff
Turgenieff, Ivan S.
Zangwill, Israel
Zola, Emile

NOVEMBER, the eleventh month in the modern calendar, but the ninth according to the old Roman method of reckoning. Its name is from the Latin *novem*, which means *nine*. When the Roman calendar was reformed and two new months were added, November became the eleventh month, but retained its name. There were several changes in its number of days, but the present number, thirty, has prevailed since the time of the Emperor Augustus. November is usually referred to in poetry in melancholy terms, for in northern climes it is a time of bare woods and gray days. The chrysanthemum is the special flower of November, and the topaz its gem.

Special Days for Observance. Thanksgiving Day, the annual festival of the American people, is always designated by Presidential proclamation as the last Thursday in November. See **THANKSGIVING DAY**.

Anniversaries for Celebration. The following birthdays of notable people fall in November.

Marie Antoinette, November 2, 1755
James K. Polk, November 2, 1795
William Cullen Bryant, November 3, 1794
Ella Wheeler Wilcox, November 5, 1855
John Philip Sousa, November, 1856
Mohammed, November 10, 570
Martin Luther, November 10, 1483
Oliver Goldsmith, November 10, 1728
Friedrich Schiller, November 10, 1759
Joaquin Miller, November 10, 1841
Henry Van Dyke, November 10, 1852
Thomas Bailey Aldrich, November 11, 1836
Saint Augustine, November 13, 354
Robert Louis Stevenson, November 13, 1850
Jacob Abbott, November 14, 1803

William Pitt, November 15, 1708
 John Bright, November 16, 1811
 James A. Garfield, November 19, 1881
 Sir Wilfrid Laurier, November 20, 1841
 George Eliot, November 22, 1820
 Franklin Pierce, November 23, 1804
 Sir Gilbert Parker, November 23, 1862
 Andrew Carnegie, November 25, 1827
 Louisa M. Alcott, November 29, 1832
 Samuel L. Clemens, November 30, 1835

The following important events occurred in November

Destruction of Lisbon by an earthquake, November 1, 1755

Close of Thirty Years' War, November 3, 1648
 Denver made the capital of Colorado, November 4, 1881

Gunpowder Plot foiled, November 5, 1605

Jefferson Davis elected President of the Confederacy, November 6, 1861

American troops occupy Sedan, November 6, 1918

Battle of Tippecanoe, November 7, 1811

German envoys sign armistice terms and fighting in the World War comes to an end, November 11, 1918

Articles of Confederation adopted November 15, 1777

First session of Congress in Washington opens on November 17, 1800

Treaty signed by the United States and Panama providing for a canal, November 18, 1903

Gettysburg field made a national cemetery, November 19, 1863

Vasco da Gama rounds the Cape of Good Hope, November 20, 1497

Battles of Chattanooga, November 23-25, 1863

Abdication of William II, Emperor of Germany, November 28, 1918

Preliminary treaty of peace between the United States and England, November 30, 1782

NOVOCAINE, *no'vo kane*, a drug used principally in dentistry to induce local anesthesia, but which also finds employment to some extent in surgery. While it is a derivative of cocaine, it is what is known as a synthetic drug, it is made by separating a molecule of its base (cocaine) into its constituent atoms, then combining those atoms which produce anesthetic reactions with atoms of other substances, the result being a new substance, or compound. While novocaine is considered a safe drug in the control of the practitioner, it should never be employed experimentally by the layman.

NOYES, *noiz*, ALFRED (1880-), an English poet, born in Staffordshire and educated at Exeter College, Oxford. In 1907 he married Miss Garnett Daniels, an American. In 1913 he was called to America to deliver a series of lectures at Lowell Institute,

Boston, and since then has been well known in America. Noyes is one of the foremost writers of heroic and patriotic verse and the author of numerous critical reviews and stories. A list of his work includes *The Loom of Years*; *The Forest of Wild Thyme*, *Drake*, an epic, *William Morris*, in "English Men of Letters Series", *Collected Poems*, and *Tales of the Mermaid Tavern*. His works with reference to the World War include *The Winepress*, *Roda*, and *Walking Shadows*. In 1921 he published *Beyond the Desert* and *Sherwood*, in 1934 from his pen came *The Unknown God*.

N-RAYS, the name given certain peculiar rays of light that were discovered by Professor Blondlot of the University of Nancy, while trying to polarize X-rays (see ROENTGEN RAYS; POLARIZATION OF LIGHT). The name is constituted from the first letter of the word "Nancy," where the discovery was made. N-rays resemble X-rays in some respects and widely differ from them in others. They will penetrate most substances, but not platinum, rock salt nor water. They penetrate a dry cloth readily, but the thinnest fabric, when wet, obstructs them. They render calcium sulphide and certain other substances phosphorescent, provided these substances are first exposed to the sunlight. Experiments show that N-rays exist in sunlight, but are obstructed by clouds and moisture in the atmosphere. Their properties and use are not yet well understood. Attempts to use them in photography have not been successful.

NU'BIA, a name given to a region of Northeastern Africa, bounded by Egypt on the north, by the Red Sea on the east, by Abyssinia and Kordofan on the south and by the Libyan Desert on the west. It is not a political division, as part of the territory is attached to Egypt and the rest to Egyptian Sudan. With the exception of the valley of the Nile, the country is for the most part desert. Suakin, on the Red Sea, is the only practicable port. The Nubians belong to the Arabian and Ethiopian races. They are a handsome people, of dark brown complexion, bold and cheerful and more simple in their manners than their neighbors either up or down the river.

NUISANCE, *nu'sans*, in law anything which occasions culpable annoyance or offense to a person or a community. For example, the playing of musical instruments

late at night and thus interfering with the rest of neighbors is a nuisance, likewise, the operation of a factory in a residential neighborhood is a nuisance. The former, which affects only one or two persons, is a *private* nuisance, the latter, effecting a whole community, is a *public* nuisance.

Nuisances may be dealt with by resorting to the law. A community or an individual may sometimes forestall a nuisance by securing an injunction (which see), but if the nuisance becomes established before any legal action can be taken, then the community or the individual can do nothing but bring suit for damages. In this, as in every other matter concerning human relationships, it is difficult oftentimes to determine where individual liberty ends and the rights of others begin. A street car system for instance, installed in a residential street, may depreciate the value of property and keep the owners awake half the night, but it operates as a public utility, and there is no relief in law for those who are offended.

NULLIFICATION, in American history, has meant the declared right of a state formally to suspend a law of the United States within its territory, making it null and void, at will. This right was first declared in the famous Kentucky and Virginia Resolutions of 1798, on the ground that the Union was a compact of independent states. The same right was asserted by the government of Pennsylvania in 1809 and was practically assumed by several New England states during the War of 1812. In 1825 Georgia successfully asserted its right against the government concerning a question of jurisdiction over Indian lands. The most famous instance was in South Carolina in 1828, when John C. Calhoun, in an essay called the *South Carolina Exposition*, argued that each state was a sovereign in itself, the Federal government being its agent, and that the state therefore had the right to suspend a power which it had delegated to its agent. The same doctrine was upheld by Robert Y. Hayne in his famous debate with Daniel Webster in 1830.

In both cases the immediate cause of the declaration was the protective tariff policy which injuriously affected the South. In 1833 the legislature of South Carolina declared the tariff acts of 1828 and 1832 null and void and threatened secession if the government of the United States attempted to

enforce the law. Measures of military defense were taken, but President Jackson issued a proclamation declaring his purpose to enforce the law at any cost. A bill known as the Force Bill (see **FORCE BILLS**) was passed in March, 1833, but compromise was meantime effected, and the nullification ordinance was repealed.

NUMA POMPIIUS, the second king of Rome, who is said to have reigned from 714 to 672 B. C., and to have been distinguished as philosopher and legislator. Though his existence was probably more legendary than historical, he was regarded as the founder of the most important religious institutions of the Romans, and the author of many official writings, which were burned by order of the Senate when accidentally discovered 400 years after his time.

NUMBER. See **ARITHMETIC**.

NUMBER, -METHODS OF TEACHING. Instruction in number should secure two results, namely, (1) comprehension of magnitude and magnitude relations and (2) ability to use figures accurately and with facility. At the outset the teacher should understand that numbers are not things or qualities of things, but that number is a relation, which is obtained only through mental processes.

Primary Grades. Children have more or less knowledge of number when they enter school. This is manifested by their tendency to count and to measure. A test will probably show that most of them know number as far as five and that all have the idea of magnitude. The work in these grades should proceed along the following lines:

(1) **Obtaining a knowledge of magnitude and magnitude relation.** This should be done by measurement, since measurement is the foundation of all number work. Pupils should at first be given objects of different sizes, such as blocks of different lengths and encouraged to compare them. They will express the result of their comparisons in such terms as *larger* and *smaller*, *longer* and *shorter*.

(2) **Counting.** Pupils should be led to count by noticing the number of objects in different groups, as three marbles, four blocks, five flowers. A serious mistake is often made in teaching children to count by single objects, as by pointing to each of a series of blocks and

counting one, two, three, four. Unless the child already knows what two, three and four are, he gets the idea that these words are names of the different blocks, rather than groups of objects

(3) **Perfecting the idea of magnitude.** The ideas first obtained are vague, as expressed in comparisons, such as larger, smaller. The pupils should soon be led to form definite ideas of such dimensions as foot, inch, yard, pound, pint and other units of measure in common use. This should be done by using the measures. In primary grades this work will proceed very slowly and in connection with other lessons. In many well-graded schools lessons in number are not given any separate period during the first year, but are given incidentally in connection with other lessons, such as nature study and language.

(4) **Obtaining an idea of proportion, or relative magnitude.** Pupils should be led to form ideas of the relations of objects of different sizes, such as the relation of an inch cube to a two-inch cube, of a prism two inches long and an inch square to one two inches long and two inches square, and of a pint to a quart. These ideas are obtained by the use of the objects, which should always be at hand when new work in number is attempted.

(5) **Learning to use figures.** Since figures are the symbols of numbers, they should not be introduced until the ideas which they represent are fully understood. Ordinarily they may be introduced about the beginning of the second year. In their introduction the following order should be observed: (a) The idea should be represented by the object, (b) the idea should then be represented by the written word, (c) the written word should be followed by the figure. After the figures have been introduced, in the following lesson the pupils should be tested, so that the teacher may know that they understand what each figure represents. This can readily be done by asking the different pupils to bring the teacher the number of objects which the figure written upon the board represents.

(6) **Gaining habits of accuracy.** Accuracy is essential to success. Unless the teacher insists upon accurate work from the beginning, habits of carelessness are formed which are liable to affect the pupil all through his school life. Most errors result from hasty and careless observation, hence, the pupil should be led to observe carefully and to form definite and accurate conclusions. By continual persistence in this method, the habit of accuracy will be established.

(7) **Gaining facility in arithmetical operations.** As fast as the pupils obtain accurate ideas, they should be drilled in the use of these until they acquire facility. This can be accomplished by devoting a portion of the number period each day to review drills.

(8) **Memorizing the facts of number.** As fast as the facts of number are understood, they should be learned. These facts of elementary number are comparatively few. There are only forty-five in addition and sixty-four in multiplication. When these are learned,

they carry with them the primary facts of subtraction and division, and all should be mastered by the time the child has completed his third year in school.

Intermediate and Grammar Grades. In the intermediate grades the work in number usually passes to the work in arithmetic. This is different in degree, but not in kind. The text-book is usually introduced into the fourth grade, and unless the pupils have been prepared for this in the preceding grade the teacher should devote the first few lessons to such review as may be necessary to introduce the class to the book. The same methods employed in the primary grades should be continued and be extended as the needs of the class demand. Objects should be used whenever they are necessary to give the pupils a clear idea of the process under consideration.

In addition to the work in fundamental operations, the pupils of the fourth grade should acquire a clear idea of the common fractions in most general use. The primary idea of fractions should be obtained in the preceding grades, but here this idea should be elaborated and extended until the pupils are able to add and subtract fractions of different denominations as far as twentieths, by reducing them to equivalent fractions having the same denominator. The principles of the reduction of fractions can easily be learned by the use of drawings or paper, which can be folded to represent the necessary divisions.

Teachers often err in not making a distinction between an equal part of an object and one of a group of objects of the same sort, as using one of four apples to represent $\frac{1}{4}$. The difference between one of four apples and one-fourth of an apple should be apparent, but when one illustration is used for the other, it often leads to a confusion of ideas. The teacher should also see that the pupil has a correct idea of the unit value of his result. Failure to do this often leads to ridiculous conclusions. For instance, the division of $\frac{3}{4}$ by $\frac{1}{4}$ gives a quotient of $1\frac{1}{4}$, but when questioned as to what the $1\frac{1}{4}$ represents, the pupil is very likely to have the idea that the number represents $1\frac{1}{4}$ units or wholes.

Many practical problems should be given in these grades. In difficulty they should be kept within the capacity of the pupils, and they should deal with the affairs of daily occurrence. Common weights and measures,

the use of decimals as applied to money and the simple computations found in stores should be thoroughly taught in the fourth grade. These problems should constitute a part of the seat work and a part of the recitation work. The seat work should be done with care and supervised by the teacher, otherwise pupils will fall into the very injurious habits of listlessness and inaccuracy. When this occurs the seat work is of little or no benefit.

Denominate numbers, as far as they are in common use, should be taught in the intermediate grades. This should be done by the use of common weights and measures and their application to such problems as occur in actual business. After these measures have been learned by use, their tables can be memorized. Pupils should also be taught, in connection with this work, to write receipts and promissory notes and to make out bills of items bought and sold. In the higher grades the operations in percentage, including profit and loss, interest and discount should receive special attention, but the books used in these grades usually give such explanations as to render the discussion of special methods unnecessary. See ARITHMETIC.

NUMBERING MACHINE, a machine for impressing consecutive numbers on account books, coupons, railway tickets, bank notes and other forms of commercial papers. One of the principal forms consists of a series of disks or wheels, each numbered to ten on its circumference. All are mounted on one axle, upon which they turn freely, acting upon one another in serial order. The first wheel of the series, containing the units, is moved one figure by each stroke or movement, and when the units are exhausted, the tens come automatically into action and act with the units, so that for every ten units marked off, one ten is marked off. When the disk of tens has moved ten times, the hundred disk moves once. Often there are wheels representing thousands and even ten-thousands.

NUMBERS, BOOK OF, the fourth of the books of the Pentateuch, containing a record of the numbering of the Israelites, hence its name. It gives a narrative of the journeyings of the Israelites from the time of their leaving Sinai to their arrival at the plains of Moab, besides parts of the Mosaic law. Formerly the authorship was attributed to

Moses, but modern scholars assert that the book is made up of several parts, each of which had a separate author.

NUMIDIA, an ancient country of northern Africa, corresponding roughly to modern Algeria. It was divided among various tribes, but after the Second Punic War it was united under Massinissa, and several of its rulers became noted in Roman history. In 46 B. C. it became a Roman province, and at the division of the Roman Empire it became a part of the Western Empire.

NUMISMATICS, the science which treats of coins and medals with reference to their artistic, historical and economic value. Present-day usage restricts the term *coin* to a piece of money, usually of metal, and the term *medal* to a small ornamental metal disk made in honor of some person or event. The side of a coin bearing a head, bust, figure or national emblem is called the *obverse*, the opposite side, the *reverse*. The *legend* is printing around the border, while the *inscription* is the writing in the middle part, or *field*. The space beneath the design, usually occupied by the date, is the *exergue*. In minting, coins are either *cast* or *struck*; when cast they are made by pouring molten metal into molds, when struck, by exerting upon them sufficient pressure with a die to impress a design. The metals most generally employed in making coins are gold, silver, nickel, copper and bronze.

The first coins were probably made in Asia, the oldest in existence are Greek, of the fifth century B. C. In ancient, as in modern times, the coins of kingdoms and empires bore the portrait of the reigning prince, those of free states some characteristic or symbol device. On Egyptian coins are pictured the ibis, isstrum, crocodile, on African, the elephant, on Arabian, the camel. Some of these coins were oval in shape, but most of them were circular. The most beautiful coins ever made are those of the fourth century (B. C.) in Greece, these are the work of some of the greatest of Greek sculptors. Ancient coins are not dated, but the numismatist is able, by reference to the design to determine with accuracy the period and country to which an antique coin belongs.

The earliest coins of the American colonies were made in Massachusetts in 1652, in 1662 the famous "pine tree shillings" were first minted there. The mint of the United States was established at Philadelphia in 1792.

NUMMULITE (Latin *nummus*, meaning *money*, Greek, *lithos*, meaning *stone*), a common name given to fossils (see FORAMINIFERA) having somewhat the appearance of money. The shell has no apparent opening, and internally it contains a spiral cavity, divided by partitions into numerous chambers, communicating with one another by means of small openings. Nummulites vary in size from less than one-eighth of an inch to one and one-half inches or more in diameter. They occupy an important place in geology, on account of the prodigious extent to which they are accumulated in the lower Tertiary strata. They occur so abundantly in some parts of the Eocene formation, that the name of *nummulitic limestone* is given to certain of the strata. This series, characteristic of the Old World, often attains a thickness of many thousand feet and extends from the western shores of Europe and Africa through Asia to Eastern China. The pyramids of Egypt are constructed of a stone largely composed of nummulites.

NUN, in the Roman Catholic Church a woman who retires from the world, joins a sisterhood, takes upon herself the vow of celibacy and other vows required by the discipline of her convent and consecrates herself to a life of religious devotion. The first nunnery is said to have been that founded by a sister of Saint Anthony, about A. D. 250, and the first in England was founded at Folkstone, by Eadbald, king of Kent, in 630. At present the number of nuns is largely in excess of that of monks.

NUNCIO, *nun'she o*, an ambassador of the first rank (not a cardinal) representing the Pope at the court of a sovereign. A papal ambassador of the first rank, who is at the same time a cardinal, is called a *legate*. The title of *internuncio* is given to an ambassador of inferior rank, who represents the Pope at minor courts. Formerly the papal nuncios exercised the supreme spiritual jurisdiction in their respective districts, but now in a Catholic kingdom or state which holds itself independent of the court of Rome in matters of state discipline, the nuncio is simply an ambassador.

NUREMBERG, *nu'rem burg* (German *Nürnberg*), GERMANY, a city of Bavaria, situated on the Pegnitz River, ninety-five miles north of Munich. It is surrounded by well-preserved ancient walls, with numerous massive towers and gateways, and the whole

is enclosed by a dry moat. The Pegnitz, traversing the city from east to west, divides it into two nearly equal parts, which communicate by numerous bridges. Nuremberg contains a large market place and a number of interesting buildings, among which are the Church of Saint Lawrence, the Church of Saint Sebaldus and the medieval imperial castle, the Kaiserburg. The general appearance of the place is distinctly medieval, and it is one of the quaintest cities of Europe.

Nuremberg has extensive breweries and produces, also, large quantities of toys, fancy articles in metal, carved wood and ivory, as well as chemicals, clocks, watches, cigars, lead pencils and Diesel engines. The city is celebrated for the invention of watches in the fifteenth century. Nuremberg was an independent imperial town down to 1806. It was one of the first of the imperial towns to cast its lot for the Reformation, and it suffered extensively during the Thirty Years' War, when Gustavus Adolphus was besieged there by Wallenstein. Before the discovery of the water passage to India, Nuremberg was the great mart for the produce of the East coming from Italy and going to the north. Its trade, though it has declined somewhat, is still important. Population, 1933, 410,440.

NURSE, a person who takes care of the sick, infirm or disabled, or of babies and small children. The nursing field belongs in the main to women. What is known as the *professional nurse* is a woman with special hospital training, who on completion of a prescribed course is granted a certificate, or diploma, that gives her a definite professional standing. Trained nurses are a part of the staff of every hospital, and they are also found in orphanages and other benevolent institutions. Some engage in nursing in homes, and others are connected with social settlements or with visiting nurses' associations, for service among the poor. Trained nurses are becoming a part of the public school system in large cities, and many heads of industrial establishments who employ large numbers of workers also find them indispensable. During the World War thousands of women served in military hospitals in camps and in the cities, under the auspices of the Red Cross Society. The heroism of these women and their devotion to duty form an inspiring chapter in the story of that great struggle.

The Nurse's Training Every modern hospital includes in its activities a course in nursing. The courses vary from two to three years. The first period of training, lasting from three to six months, is a period of probation, it is a good test of the candidate's aptitude for the work and her seriousness in taking it up. If she is undeterred by these months of hard and disagreeable duties, fatiguing routine and what may sometimes seem to be petty tyranny, she has in all probability the necessary qualifications.

At the end of the probation period the prospective nurse has learned to make herself useful in the wards, gained elementary knowledge of medicines and how to mix them, and has become experienced in making surgical supplies. As a pupil nurse she acquires practical experience in nursing, learns how to assist in operations and covers certain prescribed courses in anatomy and physiology, bacteriology, dietetics, massage, bandaging, etc. Each day is definitely marked off into periods of work, study, rest and recreation and pupils are expected to obey rules implicitly.

Graduate nurses who continue in hospital work do not as a rule receive large salaries, but their remuneration is almost clear gain because lodging, meals, laundry and medical service are furnished free. Ambitious women work up to good positions as head nurses or superintendents of training schools. Private nurses command \$50 to \$60 a week or more, but they are not always assured of regular work. Whatever line of work she takes up, the nurse must be willing to think of others before she considers herself, and to carry on her work of mercy and healing with poise and cheerfulness. See HOSPITAL.

NURSERY, in agriculture, a tract of land devoted to raising shrubs or trees for sale. In its broadest sense the term includes the culture of herbs and plants, as well as trees and shrubs, but in America the meaning is restricted as above. Ornamental trees and shrubs are extensively cultivated in the western part of New York state, in the vicinity of Rochester. However, in the United States by far the largest part of the nursery business is confined to the growing of apple trees. Most of these trees are grown by grafting the scions into native stock (see GRAFTING). Many large nurseries specialize in the propagation of shade-trees for lawns and parks.

NURSERY RHYMES See MOTHER GOOSE

NUT, a hard, one-seeded fruit, containing an oily meat enclosed in a shell. Although it is not, strictly speaking, a nut, the peanut is commercially treated as such. The most common varieties of nuts are the hazelnut, the chestnut, the English walnut, the hickory nut, the pecan and the Brazil nut. The Brazil nut and the cocoanut are products of tropical climates. Almonds, English walnuts, chestnuts and pecans are grown successfully in California and in some other parts of the United States. The walnut crop and the almond crop of California are both valuable, also the pecan crop of several Southern states. Nuts are valuable for food, since they contain suitable proportions of fat and other nutritive matter. When eaten in connection with other food, they are found to be digestible and healthful, and they are now extensively used in the manufacture of "prepared foods."

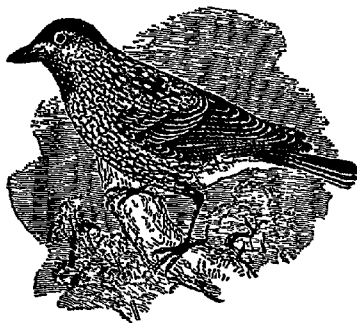
Related Articles. Consult the following titles for additional information:

Almond	Chestnut	Peanut
Betel	Cocoanut	Pecan
Brazil Nut	Hazel	Pistachio
Butternut	Hickory	Walnut

NUTATION, in astronomy, a small, subordinate, vibratory motion of the earth's axis, by virtue of which, if it subsisted alone, the pole would describe among the stars, in a period of about nineteen years, a minute ellipse, having its longer axis directed toward the pole of the ecliptic, and the shorter at right angles to it. The consequence of this real motion of the pole is an apparent approach and recession of all the stars in the heavens to the pole in the same period, and the same cause will give rise to a small alternate advance and recession of the equinoctial points, by which, in the same period, both the declinations and the right ascensions of the stars will be also alternately increased or diminished. This nutation, however, is combined with another motion, namely, the precession of the equinoxes (which see), and in virtue of the two motions, the path which the pole describes is neither an ellipse nor a circle, but a gently undulating ring, and each of these undulations constitutes a nutation of the earth's axis. Both these motions and their combined effect arise from the action of the sun and moon upon the earth.

NUTCRACKER, a bird common in the mountains of central Europe and sometimes

seen in England, so called because of its habit of cracking the seeds of various fir trees (its principal food) by holding the



NUTCRACKER

cones in its claws and hammering upon them with its bill. The bird belongs to the crow family, and is about the size of a jackdaw.

NUTHATCH, the common name of several very active little birds, that are common in most parts of North America and Europe. They are usually of shy and solitary habits, frequenting the woods and feeding chiefly on insects, which they find in the crevices of the bark of trees.



NUTHATCH

They are usually seen head downward, working around the trunk of the tree, peering sharply into the crevices and steadily calling out their rough cries—nasal notes which seem altogether too loud for such small birds. The white-breasted nuthatch of the United States is of a slatish-gray color, with brownish lower parts, white throat and a white line over its eye.

NUTMEG, the kernel of the seed of an evergreen tree growing principally in the islands of the East Indies, used commercially as a spice. The fruit is pear-shaped and about two inches in diameter. When thor-

oughly ripe it splits open to two nearly equal longitudinal sections, presenting to view the nut or seed, surrounded by a crimson jacket, the *mace* of commerce. When the thin hard shell of the nut is taken off, the wrinkled, oval kernel is exposed, this is the nutmeg of commercial value.

The nutmeg tree has been introduced into



NUTMEG

a, fruit bursting open, b, the same, with one valve removed, showing the seed, c, section of seed, d, seed with the covering removed.

Sumatra, India, Brazil and the West Indies. It reaches a height of twenty or thirty feet, and produces numerous branches. The color of the bark is a reddish-brown, that of the young branches, a bright green. The nutmeg is aromatic, is pleasing to the taste and smell and is much used in cookery. It yields, by distillation with water, a transparent oil, called oil of mace or oil of nutmeg.

NUTRITION, *nu trish'un*. The human body may be compared to a machine that is continuously at work and that must daily be supplied with fuel to keep it going. Unlike the lifeless machine, however, the body has forces within it that keep it in repair and make possible a rebuilding of parts worn out. The process by which the human machine assimilates food, makes use of oxygen, builds up tissues and utilizes energy in doing work is summed up in the term *nutrition*. Many different materials are needed for carrying on this process, and the person who wishes to be well nourished must know what are the essential substances.

Related Articles In the article *Domestic Science* the reader will find a complete discussion of this subject under the subhead "What the Body Needs." For other information, consult the following titles:

Food	Digestion
Diet	Vitamins

NUX VOMICA, the fruit of a species of *strychnos*, which is found in various parts

of the East Indies It is about the size and shape of a small orange and has a very bitter, acrid taste It is a virulent poison,



NUX VOMICA

and from it is prepared an extremely poisonous drug See STRYCHNINE

NYASSA, *ni as'sa*, a large lake in South-eastern Africa, southeast of Lake Tanganyika. It is about 340 miles long and forty miles wide, and has an area of 14,200 square miles. The surface is over 1,500 feet above the sea level, the water is pure and abounds in fish. The lake is drained

southward by the Shire River, a tributary of the Zambezi. Lake Nyassa was discovered in 1859 by Livingstone. There are missionary stations and trading stations on the shores, and a road has been constructed between Nyassa and Tanganyika.

NYE, EDGAR WILSON (1850-1896), an American humorist, better known as *Bill Nye*. He became famous as a humorous lecturer, writer, and story-teller. *Bill Nye and the Boomerang*, *Forty Liars and Other Lies* and *Chestnuts* are the titles of some of his volumes, full of puns and witticisms. He wrote also *A Comic History of the United States* and *A Guest at the Ludlow*, a collection of humorous sketches and stories. Mr Nye was born in Shirley, Maine, spent his childhood in Wisconsin, was admitted to the bar in Wyoming, settled finally in New York and died near Asheville, N. C.

NYMPHS, *nimfs*, in mythology, a class of numerous inferior divinities, imagined as beautiful maidens, not immortal but always young, who were considered as tutelary spirits, not only of certain localities, but also of certain races and families. They occur usually in connection with some other divinity of higher rank. They were believed to be possessed of the gift of prophecy and of poetical inspiration. Those who presided over rivers, brooks and springs were called *Naiads*, brooding over the mountains were the *Oreads*. The *Dryads* and *Hamadryads* lived in woods and trees, the *Nereids* in the sea.



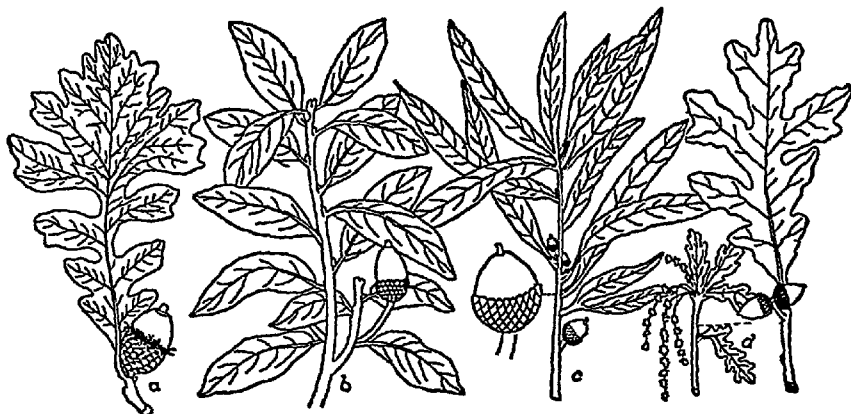
O, the fifteenth letter and fourth vowel in the English alphabet. In form, the letter is derived through the Greek and Latin from the Phoenician, its pictograph having been, probably, an eye. In English, *o* represents two main sounds—the “long *o*” sound, in *note*, *go*, and the “short *o*” sound, in *not*, *got*. Besides these, it has several other sounds—the *oo* sound in *move*, the shortened sound corresponding to this, as in *wolf*, and the short *u* sound, in *love*. It is also a common element in diagraphs, as *oo*, *oa*, *ou*.

OAHU. See HAWAII.

OAK, OKE, a group of hardwood trees widely distributed throughout the north temperate zone. The oaks differ from other trees in their fruit, or *acorn*, a rounded nut

ing tops, and they not only add much to the beauty of the landscape, but they are of great importance commercially. Oak lumber is used in finishing interiors, in the manufacture of furniture, in shipbuilding, in making frames for machinery and carriages and in basketry, especially in the manufacture of baskets for packing fruit and vegetables. The bark, which varies from dark gray to almost black, is valuable for tanning.

Oak leaves are much used in decorative designs. As may be seen in the illustration, some oaks bear leaves with deeply-notched margins, but those of the live oak, willow oak and a few other species are smooth-edged. The live oak of America and the ilex of Europe are evergreens. The small, incon-



a. Bur oak

b. Live oak

OAK LEAVES

c. Willow oak

d. White oak.

enclosed at the inner end by a woody cup. No other trees bear acorns. An oak is a noble tree, well deserving the title, “monarch of the woods.” All but a very few species have large trunks with widely-bran-

spicuous flowers of these trees appear in catkins.

Kinds of Oaks. The most common species in North America are the white oak, the red oak, the bur oak and the live oak. The *white*

oak is found from Lake Winnipeg, in Canada, to the Gulf of Mexico. It is a large tree, with a stout trunk, and when growing in open spaces it has large, spreading branches. The wood is tough and hard and of a reddish-brown color and is extensively used for numerous purposes where strong wood is required. The *red oak* rivals the white oak in size. When the leaves appear in the spring they are pink, and in the autumn they change to a deep purple. It is from this characteristic that the tree takes its name. It is found in about the same localities as the white oak, and its timber is of equal value.

The *bur oak* is a small species, characterized by its rough bark, irregular branches and dark-colored, coarse-grained wood. The tree is of but little value except for fuel. The *live oak* is found in the Southern states and along the Atlantic coast as far north as Virginia. It often grows to a large size and has oval, dark green leaves, which remain on the tree through the year. It is a valuable timber tree. Among the foreign species the *British oak* in England and in the forests of other European countries closely resembles the white oak. *Cork oak*, common to Spain and Portugal, is valuable for its bark, which is the source of cork (see **CORK**).

OAKLAND, CALIF., the county seat of Alameda County, is situated on the continental side of San Francisco Bay, six miles from San Francisco. It is the western terminus of the Southern Pacific, the Atchison, Topeka & Santa Fé, the Western Pacific and the Sacramento Northern railroads. Electric lines and ferry boats connect the city with San Francisco. Three airports are adjacent to Oakland. The San Francisco-Oakland Bay Bridge represents a gigantic engineering project of utmost value to both cities.

The manufactories turn out about 2,500 different products, including canned goods, petroleum products, engines, castings and electrical goods. Four large shipbuilding plants have been erected. Raising flowers for commercial purposes has reached an annual value of over \$15,000,000.

The principal institutions and buildings are Mills College for Women, Saint Mary's College, two museums, the library, containing about 150,000 volumes, about 30 hospitals, 190 churches, the municipal auditorium, and the art gallery. The 46 parks cover 473 acres.

The first modern settlement on the site of

Oakland was made in 1851. A steamboat soon put in operation led to the building of houses and a suburban residence town sprang up for the convenience of San Francisco business men. Oakland College School was established in 1853 by Henry Durant, out of this grew the University of California. The city charter was granted in 1854. The first railroad terminal was arranged for in 1868. Population, 1920, 216,361, 1930, 284,063.

OAKUM, *oak'um*, the mass of hempen fibers produced by untwisting the strands of old tarred or untarred rope and by pulling apart the loose fibers into a mass. It is used for caulking the seams of ships, stopping leaks, and as a filler between looseworn slabs of city pavements. Untarred oakum is usually called *white oakum*.

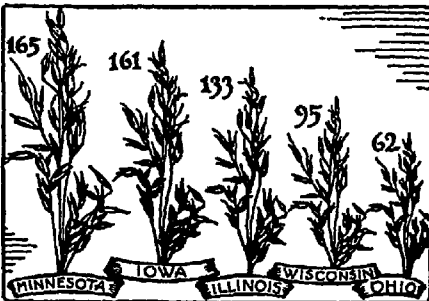
OASIS, *o'asis*, a fertile spot in a desert region. It may be merely a spring of water with a few palm trees growing about it, or, as is frequently the case, a tract large enough to support a million people. Usually the soil of deserts needs only water to make it fertile, and where this occurs there springs up an oasis. In some of the larger deserts the hills are of sufficient elevation to intercept rain-bearing clouds, in which case the slopes become clothed with verdure, and the moisture, percolating through them, finds its way out in some valley, where it takes the form of a lake, spring or small stream.

OATH, a legal term for a sworn statement made before an authorized officer. Persons taking an oath solemnly swear that certain things are true, or they pledge themselves to make truthful statements. Witnesses in court, for example, swear that they will tell the truth, the whole truth and nothing but the truth. Breaking of this pledge, called the *judicial oath*, is a form of perjury. Oaths are also required of persons submitting affidavits. Members of religious sects which take literally the Bible admonition, "Swear not," are permitted, in legal matters, to make a solemn *affirmation* in lieu of taking an oath. Such a declaration is, however, legally binding.

What is called the *extrajudicial oath* is a solemn pledge made privately, the violation of which is attended by no legal proceedings. One's conscience is the judge in such a case. Examples are pledges to abstain from liquor, tobacco and profanity. Officials sworn into public office take oaths, pledging themselves to perform their duties faithfully, and there

is also the military oath required of men enlisting for service in the army. See *PERRY*; *AFFIDAVIT*

OATS, one of the most important fodder crops cultivated, especially valuable as a grain for horses. Oats is also used extensively in making cereal foods for the table, notably oatmeal and rolled oats. Such preparations are excellent breakfast foods for cold weather, because the grain of which



LEADING STATES IN PRODUCTION

The figures represent millions of bushels per year for an average period of five years

they are made is a good heat producer. Oatmeal and similar preparations are especially recommended for children.

The grain belongs, with wheat, rye, barley and other cereals, to the grass family. The cultivated species are divided into numerous varieties, distinguished from one another by color, size, form of seeds, quality of straw, period of ripening, adaptation to particular soils and climate and other characteristics. Seeds are sown in drills or broadcast, from two to three bushels per acre being used. Spring is the best time for sowing in northern latitudes, but in southern regions good winter crops are obtained from fall sowings. The grain thrives especially well in a cool, moist climate, and while it is widely distributed and hardy, it cannot be successfully cultivated in hot, arid regions.

The yield from twenty bushels to eighty bushels per acre, according to soil and climatic conditions. In the United States the average is about twenty-

seven bushels to the acre, in Great Britain, about forty. The annual crop of the former country, about 1,300,000,000 bushels, is the largest in the world. The weight per bushel varies from thirty to forty-five pounds, and the meal product is about half the weight of the oats. Iowa, Illinois, Minnesota, Wisconsin, and Ohio are the largest producers, but oats are raised in nearly all the states. Canada's average annual production is about 500,000,000 bushels. The wild oat, a native of North Africa, is supposed to be the original of all the species.

OBELISK, *ob'elisk*, a four-sided shaft, tapering toward the top and usually terminating in a pyramid. The distinguishing characteristic of the obelisk is its extreme slenderness as compared with its height. Because of this, some of the tallest and most tapering are called *needles*. The first obelisks were made by the ancient Egyptians, who erected hundreds of them in honor of their sun god. The Egyptian obelisks were all cut from a solid block of granite, polished and inscribed with hieroglyphics. These hieroglyphics, which in many cases recorded the exploits of the king, were made before the shaft was erected.

Obelisks were frequently erected in pairs at the entrances to temples. Two famous examples are Cleopatra's Needles, erected at Heliopolis by Thothmes III, about 1500 B.C. One of these obelisks now belongs to the British government and stands on the Thames Embankment, the other, owned by the United States, stands in Central Park, New York City. Both were gifts from the khedive of Egypt. The latter is almost sixty-nine feet high, is seven feet, seven inches square at the base, and weighs 200 tons. In the Place de la Concorde, Paris, stands one of the pair of obelisks erected before the temple at Luxor, and in front of the Church of Saint John Lateran, Rome, is a shaft 104 feet high, which originally stood at Heliopolis. The finest obelisks still remain in Egypt.

OBERAMMERGAU, *obur ahm'mur gow*, a village in Upper Bavaria, celebrated for the performance, every ten years, of the passion play of Christ's crucifixion and ascension. See *PASSION PLAY*.

OBERLIN COLLEGE, a coeducational institution, founded at Oberlin, Ohio, in 1833. It was named for Jean Frederic Oberlin (1740-1826), a Lutheran pastor who spent a



IN CANADIAN PROVINCES

Millions of bushels per year.

lifetime in educational work in Alsace-Lorraine. The college was one of the first American schools to open its doors to women, in 1841 it awarded the first degrees of Bachelor of Arts believed to have been granted to a woman in America. Almost from the beginning colored students were admitted. Regular college sessions were first held in 1834; in 1835 the school of theology was added, and in 1867 the Conservatory of Music. The student enrollment is about 1,750, and there are about 185 members on the faculty. The college has a library of over 230,000 volumes.

OBESITY, *o bes'i ti*, a term used to signify excessive weight, caused by too great an accumulation of fat in the human body. Obesity may or may not be a disease, it is not so considered unless it interferes with circulation, digestion or other vital functions, and so impairs the health. Obese persons in good health usually object to this condition because it interferes with their comfort or makes them conspicuous. It is the natural thing for healthy persons to grow heavier as middle life approaches, and they should therefore modify their habits if the tendency is too pronounced. Overeating, lack of exercise and heavy drinking are common causes of obesity, but overeating is probably the cause affecting the greatest number of people. Patent preparations warranted to reduce fat are useless. The thing to do is to modify the diet. Fat people must be wary of fats, sugars and starches, for these are the foods that cause the system to accumulate fat.

Related Articles. Consult the following titles for additional information:

Calorie	Domestic Science
Carbohydrate	Food
Diet	Starch
Digestion	Sugar

OB, *o'be*, or **OB**, the westernmost of the large rivers of Siberia. It rises in the Altai Mountains, flows northwest, then north through the governments or provinces of Tomsk and Tobolsk, and after a course of about 2,500 miles pours into the Arctic Ocean through an estuary, the Gulf of Ob. Its chief tributaries are the Irtysh, the Tselum and the Tom, and the most important towns on its banks are Barnaul, Kolyvan, Naryn, Surgut and Obdorsk.

OBOE, *o'bo*, one of the most important of orchestral instruments. It is made of wood, usually boxwood, ebony or rosewood, and is in three parts, or joints, forming a tapering tube about twenty-one inches long, in

this is enclosed a smaller brass tube, which widens into a bell-shaped opening at one end and terminates in a double-reed mouthpiece at the other. In the upper and middle sections there are holes, which the player opens and stops with his fingers to produce the notes. The oboe notes are among the most beautiful heard in an orchestra, and they have a wide range.

OBSERVATORY, *ob zurv'a toh ri*, a building devoted to the observation of natural phenomena, such as the movements of the planets, the nature of magnetic forces and weather conditions. The astronomical observatory is the one of most general interest. The first European observatory was built at Nuremberg by Bernhard Walther in 1472, and this was followed in the sixteenth century by Tycho Brahe's famous observatory on the island of Hveen, near Copenhagen, while another was erected by the Landgrave of Hesse at Cassel, in 1561.

The most noted American observatories are the Yerkes observatory, Williams Bay, Wis., with a 40-inch refracting telescope, the Lick observatory, Mt. Hamilton, Cal., the Carnegie Institution observatory, Mt. Wilson, Cal., with a 100-inch reflecting telescope, the Lowell observatory, Flagstaff, Ariz., the Harvard observatories, at Cambridge, Mass., and Arequipa, Peru, the Astrophysical observatory, Washington, D. C., the Dominion observatory, Victoria, B. C.

The chief function of the observatories in connection with universities is that of teaching, but many valuable observations have been made. The national observatories, of which Greenwich Royal Observatory, England, the Canadian Dominion Observatory, at Ottawa, and the Naval Observatory, Washington, D. C., are good examples, are devoted entirely to the study of astronomical subjects and their application to governmental affairs.

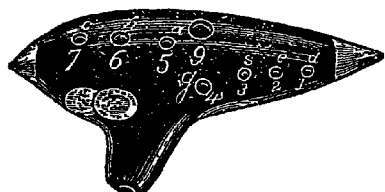
The observatory building must be constructed in a very stable manner, and all the instruments must be kept free from motion, in order to permit the delicate observations that are necessary. Accordingly, foundations separate from the rest of the building are erected, and the instruments are placed on these so that they are entirely out of contact with the walls. The chief instruments used in the observatory are the telescope, which may be in either of two forms; the transit instrument, and the sidereal and the solar clocks.

Related Articles. Consult the following titles for additional information

Astronomy Telescope
Lick Observatory Weather Bureau
Naval Observatory Yerkes Observatory

OBSIDIAN, a volcanic glass, given its hard, glassy appearance by sudden cooling. It consists of silicate of alumina, with iron and lime or potash or soda, according to the species of feldspar present, and is usually very dark gray or black. The ancient Mexicans and Peruvians made arrowheads, spearheads, knives, mirrors and ornaments of it. The largest known mass of obsidian is Obsidian Cliff, in Yellowstone National Park.

OCARINA, *ok a re'nah*, a musical wind instrument, made of clay and shaped like a



OCARINA

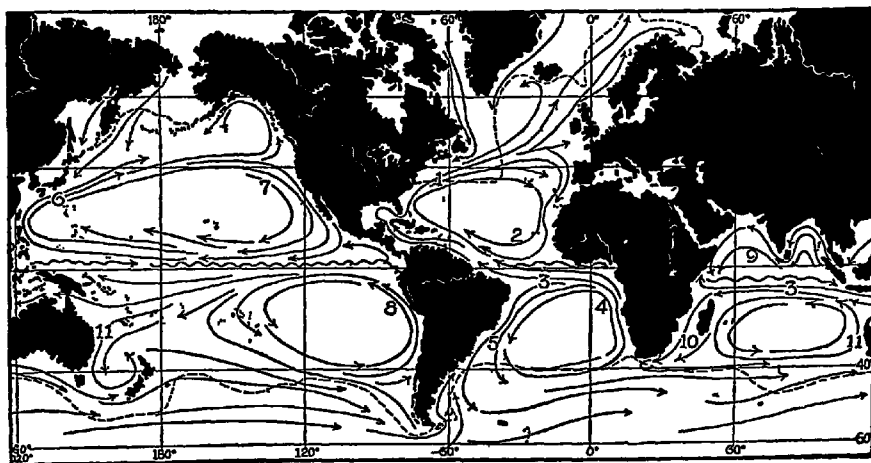
top with a spoutlike projection at one side which contains the mouthpiece. It is classed with musical toys and freaks.

OCEAN CABLE. See CABLE, SUBMARINE

OCEAN CURRENTS, streams of water, or drifts, flowing regularly through the sea. According to their position currents are clas-

sified as *deep sea currents*, *surface currents* and *drift currents*, and according to their temperature as *warm* and *cold*. Marine currents are very numerous, and taken together they constitute an oceanic circulation which secures a complete interchange of waters in each of the great branches of the ocean. The formation and character of these currents are the result of many different forces—such as variations of water temperature, winds, tides, rotation of the earth and irregularities of shores. Water contracts as it cools until it reaches the temperature of 39° F. Because of this, water in the polar regions is heavier than that in the equatorial regions. This heavy cold water tends to settle to the bottom of the ocean and the continuous settling forces the water below to move forward. Thus there is developed a deep sea current in each of the oceans, moving slowly from the polar to the equatorial regions. As these currents move to the warmer regions they become warmer and gradually rise, coming to the surface within the tropics. Surface currents counter to these flow from the tropics towards the poles. These are currents of warm water. The best illustration of them is the Gulf Stream in the North Atlantic and the Kuro Siwo, or Japan Current, of the North Pacific.

Were it not for the rotation of the earth these currents would take a due north and



THE PRINCIPAL CURRENTS

- | | | |
|-----------------------|-----------------------|----------------------|
| 1—Gulf Stream | 4—Benguela Current | 7—California Current |
| 2—Canary Current | 5—Brazilian Current | 8—Peruvian Current |
| 3—Equatorial Current | 6—Japan Stream | 9—Monsoon Current |
| 10—Mozambique Current | 11—Australian Current | |

south course, except where their direction was changed by coming in contact with islands or other obstructions in the bed of the ocean, but because of the rotation the currents moving from the equatorial towards the polar regions are deflected eastward and those moving in the contrary direction are deflected westward. For this reason warm currents usually strike the western coasts of the continents and cold currents the eastern. The effect of these currents upon climate is seen in comparing the climatic conditions of places in the same latitude on the Atlantic coasts of the United States and Europe. The climate of the British Isles is mild because of the influence of the Gulf Stream, Labrador, in the same latitude, has a severe climate because it is affected by a cold current from the north.

In the equatorial regions surface currents flow westward. When these currents strike the eastern coasts of the continents, they divide, a portion going northward and a portion southward, so that in the Atlantic and the Pacific oceans there are practically two systems of currents, those in the North and South Atlantic and those in the North and South Pacific. Because of the shape of the latter ocean, the currents in the South Pacific are less marked than those in each of the other localities. In the center of each of these areas is a large tract of water in which there are either no currents or currents of very low velocity. In the North Atlantic this region is characterized by the gathering of large quantities of seaweed, and it is often known as the Sargasso Sea. Drift currents are those broad, general movements of water in the open ocean, in which the water over a large area turns slowly in one direction. They are well illustrated by the drift of the Antarctic Ocean northward and the drift in the southern part of the Indian Ocean.

Related Articles. Consult the following titles for additional information:
 Gulf Stream Labrador Current
 Kuro Sivo Sargasso Sea

OCEAN, o'shan, or SEA, the vast body of water which covers nearly three-fourths of the surface of the globe. Although no portion of it is completely detached from the rest, the ocean has been theoretically divided into several great basins or areas, namely, the Pacific Ocean, which separates Asia and Australia from America; the Atlantic Ocean, which separates America from Europe and

Africa; the Indian Ocean, which intervenes between Africa and Australia, the Arctic and the Antarctic oceans, round the North and South poles, respectively. Between these divisions no very definite limits can be drawn, thus it is impossible to say where the Atlantic or the Pacific ends and the Antarctic or Southern Ocean begins.

There are plains, valleys, mountains and volcanoes on the ocean floor, but the vast bed of the sea is on the whole much more regular than the earth's land surface, for the latter is constantly exposed to the forces of erosion. The average depth of the ocean is 11,500 feet, and the greatest depth—near the island of Mindanao, in the Philippines—is 34,416. This is about 5,000 feet greater than the height of the loftiest mountain in the world, Mount Everest, in the Himalayas. The Pacific is the deepest of the great water divisions.

The waters of the ocean vary as greatly in temperature as they do in depth. The Pacific and Indian oceans are both warmer in low latitudes than the Atlantic, and the mean temperature of the equatorial areas at the surface is about 81.5°, the temperature of the North Atlantic is due to the influence of the Gulf Stream. This high temperature applies only to the surface water of the ocean, for experience shows that in both hemispheres and in all latitudes the water near the bottom of the ocean is exceedingly cold. In low latitudes, water at 32° has been drawn from great depths, while in high latitudes water at 26° has been found. This is accounted for by the supposition that the cold water at the poles, by reason of its specific gravity, sinks to the bottom and spreads throughout the ocean basin.

The saltness of the ocean is due to the presence of various ingredients, chiefly common salt, which are generally found in the proportion of from thirty to forty parts to one thousand. Recent observations have shown that the color and transparency of the water of the ocean are in a large measure dependent on the degree of saltness. In general, it is found that the greater the saltness the greater the transparency, and also that where the saltness is very great the water is of a dark blue color, that where it is less the water is of a lighter blue, melting to green, and that in the neighborhood of rivers, where the saltness is reduced to a minimum, it is of a greenish-yellow color.

Related Articles. Consult the following titles for additional information

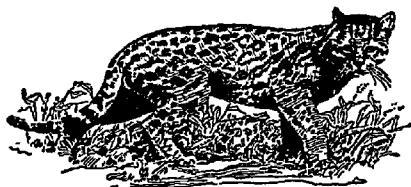
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Atlantic Ocean	Kuro Sivo
Geography (Wonder Questions)	Labrador Current
Geology (Wonder Questions)	Ocean Currents
	Pacific Ocean
	Polar Exploration
	Sargasso Sea

OCEANIA, *o she an'i a*, or **OCEANICA**, a term used by geographers to designate that part of the globe containing the innumerable islands of the Southern Pacific. Although it has no definite bounds it may be regarded as including *Australasia* (Australia, Tasmania, New Zealand and adjacent islands), *Melanesia* (Solomon, Bismarck and other archipelagoes east of the above group), *Polynesia* (a group east of the 180th meridian) and *Micronesia* (north of Polynesia).

Excluding the great islands of Australasia, almost all of Oceania lies in the Torrid Zone, its thousands of islands and islets dot the Pacific from 20° N to 23° S. While the Hawaiian group lies within Oceania, it is thousands of miles northeast from its center. The largest mid-ocean group, which include no large land masses, include the Fiji, the Samoans, the Solomons, New Hebrides, and Society Islands.

The people, all dark, are of varying stocks, and present sharp racial distinctions, and their languages differ. A few are cannibals, most of the peoples are friendly, and many of them crudely imitate the ways of white men. Life is usually easy, nature provides food in abundance, and work is unnecessary, except that fishing is a dignified local industry.

OCELOT, *o'selot*, an animal of the cat family, found in America, from Texas to



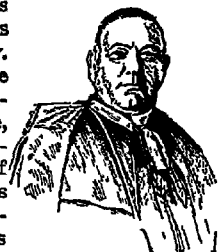
OCELOT

Patagonia. It is about three feet in length and is of a tawny or gray color on the back and sides, and white on the under part of the body. Its coat is beautifully marked with black spots and bars. The ocelot inhabits forests and lives mainly on birds and mice and other small animals. It is killed for its beautiful skin.

OCHRE, *o'kur*, a native clay containing oxide of iron and varying in color from yellow to brown. It is widely used in the manufacture of a brilliant yellow paint of the same name. France leads the world in ochre production, and before the World War Germany was second. The United States was third, deriving its chief supply from Georgia.

O'CONNELL, DANIEL (1775-1847), an Irish patriot and agitator, born in County Kerry. He was educated at the Catholic colleges of Saint Omer and Douai, in France, was admitted to the Irish bar and soon became distinguished for legal skill and oratory. Turning his energy to politics, he advocated Catholic emancipation and skilfully kept the agitation within constitutional lines. He was elected to Parliament for County Clare in 1828, but was not allowed to take his seat because he was a Catholic and as such could not take the oath required by the Test Act. In the following year, however, he attained his triumph, when the government of the Duke of Wellington granted the Catholic claims. He was returned to Parliament, and remained a member for the rest of his life. In 1841 he called enormous meetings throughout Ireland and raised a cry for the repeal of the union. This agitation Peel and the government determined to put down. They arrested O'Connell, obtained a conviction and sentenced him to twelve months' imprisonment, with a large fine. In a few months the House of Lords reversed this judgment. O'Connell made his last speech in Parliament in April, 1847, and died the following month.

O'CONNELL, WILLIAM H (1859-), an American Roman Catholic cardinal, born in Lowell, Mass., educated in Boston College and in Rome, where he was ordained in 1884. For ten years his field of work was Boston and vicinity. In 1896 he became rector of the American College at Rome, and in 1901 was consecrated bishop of Portland. Four years later he was commissioned by the pope as ambassador to the mikado of Japan on a missionary project. So successful was he that upon his return in 1906 he was made coadjutor archbishop of Boston and the



CARDINAL
O'CONNELL

following year became archbishop of Boston On November 27, 1911, Archbishop O'Connell was made a cardinal

O'CONNOR, THOMAS POWER (1848-1929), an Irish journalist and leader in the movement to secure home rule for Ireland, known popularly as "Tay Pay" He was born at Athlone, in the County of Roscommon, Ireland, and was educated in Athlone and at Queen's College, Galway O'Connor entered journalism early in his career, and was employed on Dublin and London papers In 1880 he entered Parliament as member for Galway, and became conspicuous as a member of the radical Irish party In 1883 he was elected president of the Irish National League of Great Britain, and in 1885 was elected to Parliament from Liverpool He founded and edited several newspapers, including the *Sunday Sun*, *M A P* and *T. P's Weekly*

O'Connor spent several months in the United States while America was a belligerent in the World War, being active in the support of the allied cause Though opposed at first to the Sinn Feiners, he later endorsed the movement for complete Irish independence He was a member of the House of Commons for forty-nine years

OCTAVIA, sister to the Emperor Augustus, was the widow of Claudius Marcellus, when she was married, at the instance of her brother, the triumvir, Mark Antony Antony neglected her for Cleopatra, queen of Egypt, but notwithstanding this, Octavia displayed the most noble fidelity to his house and fortunes and devoted herself to the education of his children At length he divorced her and ordered her to leave his house, a command she obeyed without complaint She died in 11 B C

OCTAVIUS, or OCTAVIANUS See AUGUSTUS

OCTOBER, *ok toh'ber*, the tenth month of the modern calendar, the name of which comes from the Latin word for *eight*, which is *octo* According to the ancient Roman reckoning October was the eighth month, but when Julius Caesar reformed the calendar, adding two months, it became the tenth The name, thus made inappropriate, was retained after several unsuccessful attempts to agree upon a new one Now, as then, October is one of the long months, having thirty-one days

In many sections of the United States and Canada it is a season of bright blue skies and

golden sunshine, and an ideal time for long jaunts through the woods The trees are getting ready for the long winter sleep, and their leaves, having given back to the parent stem their stores of plant food, are celebrating their last days of life by donning the most gorgeous shades of russet, red and yellow The October enthusiast can also tell of flowers that are still in blossom—the golden rod, the fringed gentian, "bright with autumn dew," the wild aster and others The hop blossom is the special flower of October, and the opal or tourmaline its gem

Special Days for Observance This month has a special place in American history, for it was on the twelfth of October that Columbus first sighted an island of the West Indies, the outposts of the great North American continent *Columbus Day* is a holiday in many cities, and is observed in schools with patriotic exercises *Hallowe'en*, the last day of October, is not a legal holiday, but to the young people it is a day of special privileges in the way of merry making In the article **HALLOWE'EN** the reader will find suggestions for a program suitable for school children

Anniversaries for Celebration The following birthdays of notable people fall in October

James Lawrence, October 1, 1781
George Bancroft, October 3, 1800
Rutherford B Hayes, October 4, 1822
Jonathan Edwards, October 5, 1703
Sir Isaac Brock, October 6, 1769
Jenny Lind, October 6, 1820
John White Alexander, October 7, 1856
Edmund Clarence Stedman, October 8, 1833
John Hay, October 8, 1838
Cervantes, October 9, 1547
Winfield Scott Schley, October 9, 1839
Benjamin West, October 10, 1738
Jonathan Trumbull, October 12, 1710
George W Cable, October 12, 1844
Edward Blake, October 13, 1833
William Penn, October 14, 1644
Vergil, October 15, 70 B C
Noah Webster, October 16, 1768
Helen Hunt Jackson, October 18, 1831
James Henry Leigh Hunt, October 19, 1784
Christopher Wren, October 20, 1632
Samuel Taylor Coleridge, October 21, 1772
Samuel F Smith, October 21, 1808
Will Carleton, October 21, 1845
Franz Liszt, October 22, 1811
Adlai E Stevenson, October 23, 1835
Moltke, Count von, October 26, 1800
Theodore Roosevelt, October 27, 1858
Desiderius Erasmus, October 28, 1466
Gertrude Atherton, October 30, 1858
John Keats, October 31, 1785

The following important events occurred in October:

Dynamiting of new government buildings at Quebec, October 1, 1885
 John André executed as a spy, October 2, 1780
 King Ferdinand of Bulgaria abdicated, October 3, 1918
 Chinese Senate opened, October 3, 1910
 Costa Rica discovered by Columbus, October 5, 1502
 Battle of the Thames River, Canada, October 5, 1813
 Marquis of Lorne appointed Governor-General of Canada, October 5, 1878
 Battle of Lepanto, October 7, 1571
 Beginning of Chicago fire, October 8, 1871.
 Alaska transferred to United States by Russia, October 9, 1867
 Battle of Tours, October 10, 732
 Discovery of the first land in the New World by Columbus, October 12, 1492
 Death in battle of Sir Isaac Brock, October 13, 1812
 Treaty of Peace signed by Russian czar and emperor of Japan, October 14, 1905
 Sale of vodka prohibited by czar of Russia, October 15, 1914
 Execution of Marie Antoinette, October 16, 1793
 John Brown's Raid, October 16, 1859
 Surrender of Burgoyne at Saratoga, October 17, 1777
 King Albert entered Ostend, Belgium, October 17, 1918
 Marriage of Ferdinand and Isabella, October 18, 1469
 Surrender of Cornwallis at Yorktown, October 19, 1781
 Abdication of King Otto of Greece, October 20, 1862
 Meeting of first joint Parliament of England and Scotland, October 21, 1707
 Battle of Trafalgar, October 21, 1805
 Brazil declared its independence, October 22, 1822
 Battle of Agincourt, October 25, 1415
 Battle of Balaklava—Charge of the Light Brigade, October 25, 1854
 Sweden recognized independence of Norway, October 26, 1905
 Columbus discovered Cuba, October 28, 1492
 Dedication of Statue of Liberty, October 28, 1886
 Luther's theses nailed to the Wittenberg Church, October 31, 1517
 Nevada admitted to the Union, October 31, 1864
 Surrender of Turkey in the World War, October 31, 1918

OCTOPUS, a genus of deep-sea animals of frightful appearance. The common octopus has a soft, pear-shaped body about a foot in diameter and, extending out from this, eight arms about three feet long, each equipped on the under side with a double row of powerful suckers. The free ends of the arms are tapering; at the base they are connected by a web. The animal does not swim, but moves about the bottom of the sea

by means of its arms. It weighs about sixty pounds. These animals are numerous among the coral reefs of the Mediterranean and in the West Indies. When encountered in the water, it is a dangerous adversary of man.



THE OCTOPUS

Their habits are nocturnal, and they feed upon crabs, lobsters and the like. The Chinese use the octopus for food.

ODD FELLOWS, INDEPENDENT ORDER OF, a fraternal and benevolent secret society instituted in Baltimore in 1819 by five members of the Manchester Unity Odd Fellows of England. From the first lodge (Washington No. 1, still existing) the Independent Order of Odd Fellows has spread to all parts of North America, the islands of the sea, and to seventeen foreign countries. Its purpose is to relieve distress, bury the dead, educate the orphans, and upbuild character. Since 1830 there has been expended for relief almost \$300,000,000. In 1851 a woman's branch was authorized, it is known as the Rebekah degree. There are also junior lodges for boys and girls under eighteen years of age. Unlike some benevolent societies, there is no life insurance feature connected with the order.

ODE, a lyric poem of dignified tone, usually written under the stimulus of intense feeling and dealing progressively with a single lofty theme. The Greeks called every lyrical poem adapted to singing, an ode. The principal ancient writers who employed this form of verse were Pindar, Anacreon, Sappho, Alcæus, among the Greeks, and

Horace, among the Romans As employed by English writers the ode takes either the Pindaric form of strophe, antistrophe and epode, irregularly arranged and contrasted, or, as in its later development, the form of a regular series of regular stanzas The former style is found in Dryden's *Ode for Saint Cecilia's Day*, while the latter is seen in Shelley's *Ode to a Skylark* The English poets who earned the ode to its highest point of perfection are Milton, Dryden, Collins, Grey, Coleridge, Wordsworth, Keats and Shelley, among the greatest odes in English, besides the two mentioned above, are Wordsworth's *To Duty and Intimations of Immortality*; Shelley's *To the West Wind* and *To Liberty*, Keats's *To a Nightingale* and *On a Grecian Urn*; Tennyson's *On the Death of the Duke of Wellington*, Burn's *To a Mouse* and *To a Mountain Daisy*, Bryant's *To a Waterfowl* and Lowell's *Commemoration Ode*

ODER, a large river of Germany, which rises in the extreme southern part of the country near the border of Galicia, flows north, then northwest and into the Stettiner Haff, a lagoon of the Baltic Sea, terminating in an estuary of three arms It is 562 miles long, and is navigable the greater part of its course. The principal cities on its banks are Stettin, Frankfort, Breslau and Oppeln Its principal tributary is the Warthe The Oder is connected with the Elbe by the Kiel Canal, and is an important link in the great inland waterway of which it forms a part.

ODESSA, a seaport on the Black Sea, the largest city of the Ukraine, which declared itself an independent republic after the Russian revolution of 1917 (see UKRAINE) At the outbreak of the World War Odessa was the fourth city in population in Russia, the greatest shipping point of the most fertile region of the country and the seat of the Imperial New Russian University, which enrolled about 2,000 students annually. It was also a great manufacturing center, and a beautiful modern city of fine streets and imposing buildings Odessa had a troubled career after 1914 It was bombarded during the war by a Turkish fleet, and after the revolution, when the Ukraine made a separate treaty with the central powers, it was the scene of much fighting It was alternately in the hands of the Austro-Germans and the Russian Bolsheviks, and at the close of the war was occupied by allied troops Population, 1930, 475,500

O'DIN, or **WODEN**, the chief god of the early peoples of Northern Europe, ruler of heaven and earth, from whom all their other gods were descended His wife was Frigga, and his sons were Thor and Balder In Asgaard, the home of the gods, he occupied the highest throne, from which he could see the whole universe Two ravens sat upon his shoulders, and these he was wont to send throughout the earth to bring him tidings of everything that took place He was wise and cunning, skilled in magic and poetry As a war god he held his court in Valhalla, where brave warriors were carried after death on the battlefield, to enjoy an eternal life of feasting and fighting His exploits and adventures form the theme of much early literature



ODIN
From an old manuscript

ODYSSEUS, *o dis'us* See ULYSSES

ODYSSEY, *od'is'i*, an ancient Greek epic ascribed to Homer, in which are described the wanderings of Odysseus (Ulysses), king of Ithaca, on his return from the Trojan War At the beginning of his voyage he was wrecked on the coast of Thrace, and in plundering the town of Ismarus lost many of his followers Escaping thence, he was driven by unfavorable winds to the land of the Lotus Eaters, and from there to Sicily, island of the Cyclops With twelve companions, he entered the cave of the one-eyed monster, Polyphemus, who devoured six of the intruders Ulysses made Polyphemus drunk with wine, blinded him with a burning pole and escaped with his comrades Henceforth he was pursued by the wrath of Neptune, whose son the Cyclops was After losing all his ships but one, he reached an island where dwelt the sorceress Circe, who turned many of his men into swine When he left Circe's island he sailed by the island of the Sirens, and after successfully passing Scylla and Charybdis, he reached Thrinacia, the island of Helios Here his companions killed some sacred oxen, and, consequently, on their next voyage they were all shipwrecked and drowned except Ulysses, who escaped to the island of Calypso

After remaining eight years he embarked on a raft, his ships having been lost, but was

washed ashore in Phaeacia, where he was discovered by Nausicaa, the king's daughter. On a Phaeacian ship he finally arrived in Ithaca to find his faithful wife Penelope persecuted by suitors. These he speedily overcame and then reinstated himself in his kingdom. See MYTHOLOGY, subhead *The Trojan War*.

OEDIPUS, *ed' i pus*, one of the most tragic characters in Greek legend. He was the son of Laius, king of Thebes. An oracle had foretold that he would grow up to kill his father, marry his mother and bring destruction on his native city. Laius, to prevent fulfillment of the prophecy, sent the child away with a servant with orders that he be left in some wild place to die. A shepherd found the infant, took him to King Polybus of Corinth, who adopted him and brought him up as his son.

After a number of years the prophecy was repeated to Oedipus, and he, believing Polybus to be his father, ran away to escape his predicted fate. On his travels he met Laius, became involved in a quarrel with the old man and killed him. Having guessed the riddle of the Sphinx, he received as reward the throne of Thebes and Queen Jocasta for his wife. Four children were born to them. Then a plague ravaged Thebes and the oracle on being consulted disclosed the cause of the disaster. Jocasta hanged herself, and Oedipus in anguish put out his eyes. Then he wandered forth an outcast, faithfully attended by one of his daughters, Antigone. At Colonus he bade her farewell and entered a dark forest, where, pursued by Furies, he ended his life. Two of Sophocles' tragedies, *Oedipus Coloneus* and *Oedipus Tyrannus*, deal with incidents in the life of the unfortunate king.

ŒSOPHAGUS, *e sof' a gus*, a tube extending from the pharynx to the stomach, through which food is received into the body. It is also called the *gullet*. This tube is about ten inches long, and is composed of three coats, an outer muscular layer, an inner mucous coat, and an intermediate cellular coat joining the other two. The upper part of the oesophagus is shown in the illustration accompanying the article **ABDOMEN**.

OFFENBACH, *oh' f'en bahK*, JACQUES (1819-1880), a French composer, born of Jewish parents at Cologne. He entered the Paris Conservatory in 1835, became proficient on the violoncello and for some time played

on this instrument in the orchestra of the Théâtre Comique. In 1847 he became conductor of the Théâtre Français and subsequently earned a wide reputation as a writer of light opera. *Blue Bear*, *Princess Trebizond* and *Tales of Hoffmann* are his best known operas.

OG'DEN, UTAH, the county seat of Weber County, thirty-five miles north of Salt Lake City and ten miles east of Salt Lake, on the Weber River, at the mouth of the Ogden, and on the Southern Pacific, the Union Pacific, the Oregon Short Line, the Denver & Rio Grande and two interurban railroads. The city is in a fertile agricultural and fruit-growing section, near the picturesque Ogden Canyon. The falls in the river have been utilized in the development of electrical power, which is used in Ogden, Salt Lake City and other places. The principal industrial establishments are canneries, flour mills, a tin can factory, beet sugar factories, clothing factories, meat packing plants, brickyards and sewer pipe works. There were large brewery interests before the advent of prohibition. An irrigating canal has been constructed, which supplies water to about 150,000 acres of land in the surrounding country, adapted to the raising of fine fruits and berries. The city contains the Weber Stake Academy, Sacred Heart Academy, a Carnegie Library, a state industrial school, and state institutions for the deaf, dumb and blind. The important buildings include a fine union depot, five banks, a number of wholesale houses and a Federal building. The place was settled about 1848, laid out under the direction of Brigham Young in 1850 and was chartered as a city in the next year. Population, 1920, 32,804, in 1930, 40,272, a gain of 22.8 per cent.

OG'DENSBURG, N. Y., in Saint Lawrence County, 170 miles northwest of Albany, on the Saint Lawrence River, at the mouth of the Oswegatchie River, opposite Prescott, Ont., and on the New York Central and the Rutland railroads. It has a large Canadian trade in grain, lumber, coal and manufactured goods. Water power from the river is utilized, and there are lumber mills and manufactures of news print, gloves, curtain rods, and shade rollers. The city contains five parks, the Ogdensburg Free Academy, a state hospital for the insane, the city and the Saint John's hospitals, an orphanage, a home for the aged and other institutions. The

other prominent structures include a Federal building, a state armory, a city hall, a public library and a Roman Catholic cathedral. The place was settled in 1749 and was chartered as a city in 1868. Population, 1920, 14,609; in 1930, 16,915.

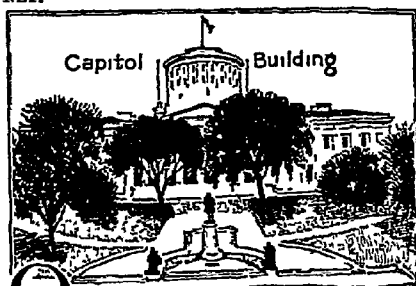
OGLETHORPE, JAMES EDWARD (about 1696-1785), an English soldier, reformer and colonist, founder of the State of Georgia. He was born at London, entered the army and became a member of Parliament in 1822. As chairman of a committee to investigate the abuses of imprisonment for debt, he conceived the plan of establishing a colony in North America where English debtors and continental Protestants might find a haven. In 1732 he secured a patent to lands in America in the present state of Georgia. He became governor of the new colony, and founded the city of Savannah in 1733. During his career in the colony, he displayed exceptional energy, liberality and executive ability. He returned to England in 1743, became a brigadier-general and took a prominent part in politics until his death.

O. HENRY. See **PORTER, WILLIAM SYDNEY.**



JAMES E. OGLETHORPE

From an old drawing



OHIO, one of the north-central states of the American republic, popularly called the **BUCKEYE STATE** because of the numerous horse-chestnut trees, or buckeyes, that grow there, but are not widely distributed now. Its formal name is borne also by the great river that separates it from Kentucky and West Virginia. *Ohio* is derived from

Ohezu, the Indian word for *great Indians*. They believed that the Ohio River extended to the Gulf of Mexico and that it should be called *The Great River*. Through Lake Erie the state has access by water to the eastern and western markets, it also possesses an abundance of natural gas and coal, a fertile soil and a favorable climate, hence it has become one of the most prosperous of American commonwealths.

Location and Size. Ohio lies midway between the Mississippi River and the Atlantic Ocean. Lake Erie separates it from the Canadian province of Ontario and for a northern boundary gives it 230 miles of shore line. The remainder of the northern state line adjoins the southern boundary of Michigan. To the west is the state of Indiana, Pennsylvania, West Virginia and Kentucky provide the eastern and southern boundaries.

The greatest distance within the state from east to west is 225 miles, from north to south it is 210 miles. The area is 41,040 square miles, of which 300 are water, omitting consideration of the waters of Lake Erie lying south of the international boundary line which is midway between the northern and southern shores.

People and Cities. In the census report of 1930 the population of Ohio was 6,646,697, or 163.1 to the square mile. If New York City were taken from New York, Philadelphia and its environs from Pennsylvania, Chicago from Illinois and Cleveland from Ohio, Ohio would rank first of all the states in population. It ranks among the first in wealth per capita. Over 65 per cent of its inhabitants are native whites of native parentage, of the foreign-born population nearly one-third are of German descent. The strongest religious denomination is the Roman Catholic, among the Protestants, the Methodists are the most numerous, followed by Presbyterians, Lutherans, Baptists and Disciples of Christ.

Twenty-six cities have more than 25,000 inhabitants each, eight have more than 100,000 population. Cleveland with 900,429 people is the sixth largest city in the Union. The next eight cities in order are Cincinnati (462,200), Toledo (300,900), Columbus, the capital (299,600), Akron (266,300), Dayton (207,800), Youngstown (175,300), Canton (108,200) and Springfield (68,743).

Surface and Drainage. The eastern part of the state belongs to the Alleghany plateau,

and the western part to the prairie region. In general, the surface is rolling and contains some hills that indeed might be called mountains if situated in a flat area. A height of land, which is a low, flat ridge, extends in an irregular direction from near the north-eastern corner to a point a little north of the middle of the western boundary, and separates the state into two drainage districts, the northern sloping toward Lake Erie and the southern toward the Ohio. To the north of this height of land the surface is more generally level and has a gentle slope. The portion to the south is much larger, and this is deeply cut by streams flowing through it to the Ohio. It is more generally rolling than the northern part of the state. It contains the highest point of land within the state at Campbell's Hill in Logan County—1,550 feet above sea level, the highest point between Pennsylvania and the Mississippi River. Some of the bluffs along the Ohio River have an altitude of 600 feet or more. A straight line drawn from East Liverpool to Cincinnati would run north of most of the hilly section of the state.

The chief rivers flowing into Lake Erie are the Maumee, in the northwestern section, the Sandusky, the Cuyahoga and the Grand. The rivers flowing into the Ohio are longer and larger than those flowing into Lake Erie. From the west eastward these are, in their order, the Great Miami, the Little Miami, the White, the Scioto, the Hocking and the Muskingum.

The Muskingum is the longest river lying wholly within the state, and is navigable for 100 miles. Many of the streams are rapid and furnish water power, which is a great aid to the development of manufactures. The rivers flowing into Lake Erie form estuaries at their mouths, which have been converted into excellent harbors in the case of the Maumee and Cuyahoga.

Climate. The climate is generally healthful, though sudden changes in temperatures are frequent and extreme. The constantly varying winds, however, greatly lessen the duration of the extremes. In the north the winters are cold, but they are moderated near the lake shore by the milder temperature of the water, the summers and autumns are temperate and pleasant. In the southern portion the winters are comparatively short and mild, and the snowfall is not heavy, the summers are long and hot. The mean annual temper-

ature is about 51°, and the annual rainfall, about thirty-eight inches.

Mineral Resources. The chief sources of mineral wealth are the bituminous coal measures and the deposits of clay. The south-eastern section is the great coal region, an area of 1,200 square miles, where some measures have a mean thickness of 15 feet. The coal is of excellent quality and in favorable periods is mined at the rate of 3,000,000 tons a month. The annual output has been equal in value to three times the nation's silver production. The clay deposits have given rise to the great pottery and tile establishments whose products exceed in worth the world's annual production of diamonds. The limestone products of Ohio exceed the nation's gold output in value, in the north there are large quarries of stone suitable for the manufacture of whetstones and grindstones. Building stones are generally distributed throughout the state, the Berea sandstone is famous. The steel products average \$620,000,000 yearly. Cleveland manufactures more automobile parts than any other city in the Union. Petroleum is found in the southeastern part and, in large quantities in a small area in and near Cleveland, but is most abundant in the northwestern section. The oil fields of Ohio yield about the same quantity as do those of Illinois. Ohio with more than 1,000,000 barrels of salt produced yearly is exceeded only by New York and Michigan, in the production of this commodity.

Agriculture. Farm products amount to some \$95,000,000 in value each year. Over nine-tenths of the land area is devoted to farms, over four-fifths of this acreage has been improved. With the exception of a small area in the southwestern corner, the soil is fertile and well suited to general agriculture. The region sloping toward Lake Erie contains considerable clay and is well adapted to growing wheat. The bottom lands along the rivers are especially suited to growing corn, while fruits, vegetables, oats and potatoes are generally grown throughout the state. Ohio has taken high rank among the states in the production of cloverseed, grapes, butter, apples, eggs and poultry, tobacco, milk, vegetable crops, corn, oats, wool, wheat, potatoes, hogs, hay and rye in the order named. Records have shown that Ohio had 460,000 horses, 33,000 mules, 4,816,000 cattle, 1,120,000 sheep, 1,214,000 hogs during one

year. Ohio wool is the standard by which all fine wool is judged in this country. Of the fruits, apples are grown in the greatest abundance, the counties bordering on Lake Erie are centers of grape and peach production. Ohio is the home of the Rome Beauty apple which is named from Rome Township in Lawrence County where it was first propagated.

Forests. About one-fifth the surface of the state is forest-covered, the principal woods being oak, hickory, ash, poplar, pine, elm, birch, locust, beech, walnut, chestnut and hemlock. Ohio is a source of valuable hardwood lumber, and is a leading state in maple-sugar products.

Manufactures. In value of manufactures, Ohio ranks fifth in the United States in average years, following New York, Pennsylvania, Illinois and California. The annual value of its manufactures is about three and one-quarter billions of dollars, which exceeds the total value of agriculture and mining products combined. The state is notable in the manufacture of iron and steel products, the annual output is approximately \$620,000,000 in value. Cleveland is the largest center of the industry. Ohio and Pennsylvania together produce over half of the American output of these commodities.

In the value and variety of its clay products Ohio has no equal among the states. It produces brick and tile and especially sewer pipe (nearly nine-tenths of the national product) and vitrified brick in vast quantities. East Liverpool and other cities in the Ohio River Valley are chief centers of this industry, at Cincinnati is produced the much-prized Rookwood ware which is frequently called the "world's finest art pottery." Much of the yellow or pink tableware produced is manufactured at Crooksville and Sebring, Ohio. There is a large output of cement manufactured from limestone and marl.

Slaughtering and meat packing, which are carried on most extensively at Cincinnati, manufacture of flour and gristmill products, glass-making, soap-making wagon and automobile manufacture are significant industries. Norwood, Ohio, leads the world in the production of playing cards. Toledo is a center for cut glass manufacture, scales and spark plugs. Akron is the leading city in the Union and probably in the world in producing rubber goods, particularly automobile tires. Dayton is the world's chief center for

the making of cash registers, electric refrigerators, home power plants and taximeters. Cincinnati is famous for its production of vaults and safes. Cleveland leads in the manufacture of clothing for men and women. Other prosperous lines of manufacture are boots and shoes, tobacco products, and agricultural tools. Printing and publishing are large industries, Springfield stands third among the nation's cities in postal shipments because of the output from The Crowell Publishing Company. In the production of electric current Ohio is surpassed by only three states, and by only New York state in the use of electricity on farms. Ohio licenses about 1,600,000 automobiles each year, here she stands fifth among the states, as also for the amount collected by tax on insurance licenses—nearly \$7,000,000.

Transportation. The high development of manufactures in Ohio is dependent on the unusual facilities for transportation by water and rail. Lake Erie and the New York State Barge Canal carry traffic to the Atlantic Coast, the Great Lakes lead to the states of the Northwest, the Ohio River connects with the Mississippi Valley. The canals of Ohio are no longer in use, their reservoirs have been converted into pleasure resorts. Great trunk lines of railways connect Ohio with all of the states of the Union—the Baltimore & Ohio, Cleveland, Cincinnati, Chicago & St. Louis, Erie, New York, Chicago & Saint Louis, Pennsylvania, Norfolk & Western and the Wabash. There are in all 35 lines with a total of nearly 9,000 miles of track within the state. The electric lines amount to some 2,000 miles. Ohio has 84,000 miles of overland roads, of these 42,000 miles are surfaced and 26,000 are hard surfaced. The Dixie Highway crosses from north to south and the Lincoln Highway and the National Trail cross from east to west. Ohio is indeed the "Gateway to the West" as many of the great railways, the air routes and the main east and west national trails pass through the state.

Government. Ohio is governed under a constitution adopted in 1852. It has been several times amended; in 1912, a large number of progressive provisions were adopted. The question of assembling a convention to revise, alter or amend the constitution may be submitted to the people every twenty years, counting from 1912. The executive department consists of a governor,

lieutenant-governor, secretary of state, treasurer and attorney-general, elected for two years, and an auditor, elected for four years. The legislature consists of a senate of thirty-three members and a house of representatives composed of 123 members, elected for two years. The supreme court is at the head of the judicial system. It consists of seven judges elected by popular vote for six years. In each of the appellate districts there is a court of appeals consisting of three judges, elected for six years. Each county has a court of common pleas, the judges of which are elected for six years.

All state, county and municipal officers are nominated in primary elections, and the initiative, the referendum and the recall of elective officers have been adopted. There are statutes relating to female and child labor, workmen's compensation, widows' pensions, and old age insurance.

Education. More than \$115,000,000 is expended annually for public education; of this \$82,000,000 is for maintenance. Attendance at school is compulsory for children between the ages of eight and fourteen and for unemployed young people between fourteen and sixteen who cannot read and write. A director of education appointed by the governor for four years is at the head of the public school system. In many rural districts there are well-organized consolidated schools; the number of centralized schools is over 1,000. In townships where this system prevails the pupils are conveyed to the school building at public expense. Among native whites the illiteracy rate is 0.7 per cent; the total number of illiterates in the state is only about 123,000.

Four universities are under state control: Ohio State University at Columbus, Ohio University at Athens, Miami University at Oxford, and Wilberforce University (for colored students) near Xenia. The state teachers colleges are situated at Kent and Bowling Green. Other institutions for higher learning are as follows: Antioch College, Yellow Springs; Ashland College, Ashland; Baldwin-Wallace College, Berea; Capital University, Columbus; College of Wooster, Wooster; Defiance College, Defiance; Denison University Granville; Findlay College, Findlay; Heidelberg College, Tiffin; Hiram College, Hiram; Kenyon College, Gambier; Marietta College, Marietta; Mount Union College, Alliance; Muskingum College,

New Concord; Oberlin College, Oberlin; Ohio Northern University, Ada; Ohio Wesleyan University, Delaware; Otterbein College, Westerville; St. John's University, Toledo; University of Akron, Akron; University of Cincinnati, Cincinnati; University of Dayton, Dayton; University of Toledo, Toledo; Western Reserve University, Cleveland; Wittenberg College, Springfield.

The total number of institutions for higher education is 56; to these should be added the five junior colleges.

Other Institutions. The charitable and corrective institutions include hospitals for the insane at Athens, Cleveland, Columbus, Dayton, Lima, Longview, Massillon and Toledo; a hospital for epileptics at Gallipolis; institutions for the feeble-minded, the blind and the deaf at Columbus; a hospital for the feeble-minded at Orient; a tuberculosis sanatorium at Mount Vernon; a soldiers' and sailors' home at Sandusky; a boys' industrial school at Lancaster and one for girls at Delaware; a state penitentiary at Columbus; a prison farm at London; a state reformatory at Mansfield; a reformatory for women at Marysville; a state brick plant, used as a penal institution, at Junction City; a soldiers' and sailors' home at Sandusky; a soldiers' and sailors' orphans' home at Xenia; a national soldiers' and sailors' home at Dayton; a national reformatory and a national hospital at Chillicothe.

History. Ohio was probably entered by La Salle as early as 1670, and the French took formal possession of the whole Northwest in the following year. A few years later conflicting claims arose between the French and the English regarding this territory, which were set at rest by the Treaty of Paris in 1763, by which France surrendered to Great Britain all its lands in the North and West as far as the Mississippi. In 1787 the Ohio Company was organized in New England by soldiers who had served in the War of the Revolution, among whom Manasseh Cutler and Rufus Putnam were conspicuous, and under their auspices a large tract of land was purchased from the government in the territory including portions of Washington and Athens counties. This was the first public sale of land by the United States government. In connection with its sale, the famous Ordinance of 1787 was passed.

In 1788 Marietta was founded and Gal-



SHEEP

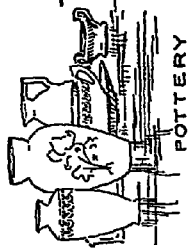
EGGS



APPLES



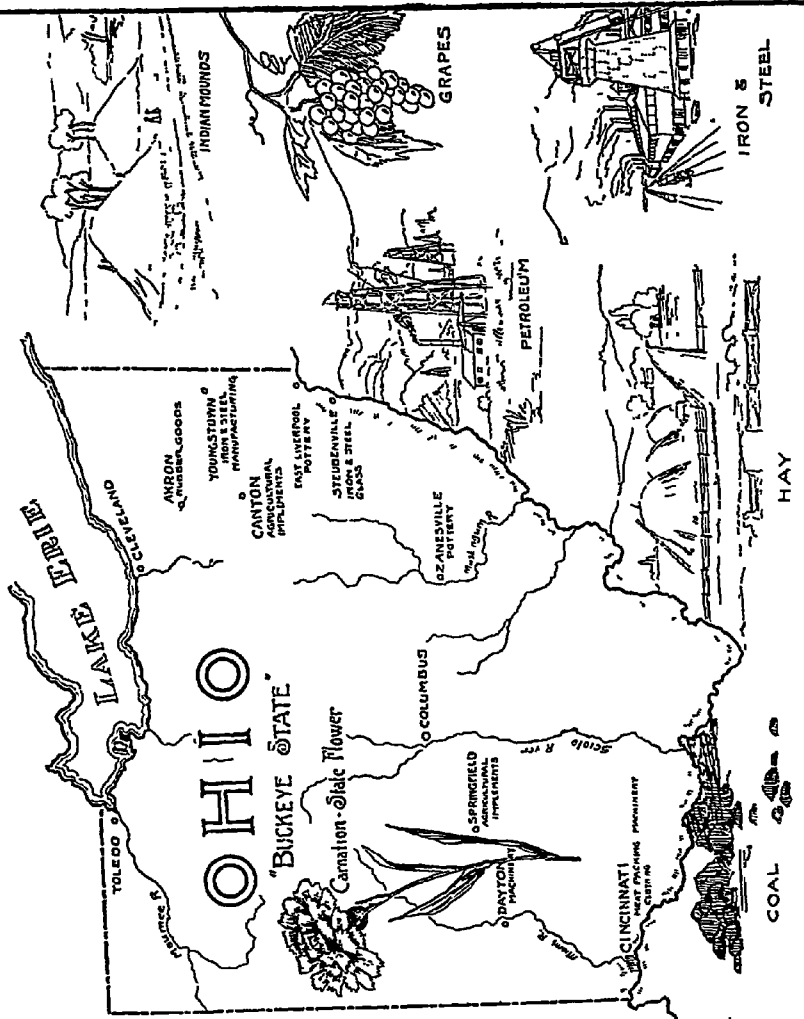
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POTTERY

PRESIDENTS FROM OHIO
 U S GRANT
 R B HAYES
 J A GARFIELD
 BEN HARRISON
 WM McKinley
 W H TAFT
 W G HARDING

NOTED MEN
 GEN SHERMAN
 JAS Mc PHERSON
 GEN Mc DOWELL
 GEN ROSSIGN
 SEN FORAKER
 J D ROCKEFELLER
 MARCUS HANNA
 WRIGHT BROTHERS
 EDWIN STANTON



Items of Interest on Ohio

Among the most interesting of American antiquities are the mounds built ages ago by a prehistoric race of unknown origin. In Ohio there are over 10,000 of these mounds of varied shaped and sizes. Six of the nation's ten great prehistoric earthworks are in Ohio.

Seven Presidents were natives of the state. Grant, Hayes, Garfield, Benjamin Harrison, McKinley, Taft and Harding. William Henry Harrison was elected from Ohio and is usually considered Ohio's first President.

Marietta is said to be the first "free born" city in the world, it was the first permanent settlement in the Northwest Territory.

The state as a whole has a bonded debt of only \$250,000.

Ohio has more towns and hamlets than any other state, yet it has extensive and splendid agriculture sections all over the state. About 68 per cent of population live in towns and cities.

The state flower is the scarlet carnation.

Ohio's state flag is the only one which has the pennant form.

The city of Cleveland was named from Moses Cleaveland its founder. The change in spelling was adopted by a printer in 1831 because the shorter form exactly fitted his headline space.

Famous personages whose home has been in Ohio include such names as John Hay, General Sherman, Lyman Beecher, John D. Rockefeller, Edwin M. Stanton, Thomas A. Edison, Dan Emmet, Alice and Phoebe Cary, W. D. Howells, John Brown, Lowell Thomas, Clarence Darrow, Brand Whitlock, Paul Dunbar, and Keweenaw M. Landis.

The first observatory in the United States was erected in Cincinnati in 1843. John Quincy Adams laid the corner stone.

In 1846 Ohio and Michigan threatened an interstate war for the possession of a strip of land including Toledo.

Oberlin College in 1841 granted the first degrees of Bachelor of Arts awarded

to women in the United States.

Any Ohio town with a population of 5,000 or more inhabitants is permitted to frame and adopt a charter for incorporation as a city. Any city may adopt the commission form of government.

The first Methodist mission in the United States was established in what is now Upper Sandusky, the old building is yet standing.

The drinking water of Ohio is "sweet," that is, not tainted with the residue of leaf occasioned by reservoir storage.

The phrase "O.K." originated in Ohio in the words "Oll Korreck" used in the Harrison campaign of 1840 but which an innkeeper reduced to a shorter form in his sign, "The O. K. Inn."

The highest point north reached by the Confederate soldiers during the Civil War is seven miles south of Lisbon, Columbiana County, where John Morgan surrendered to Major Rue in 1863.

Three cities have served as capitals of Ohio. Chillicothe, Zanesville and Columbus.

Questions on Ohio

Describe the surface of Ohio and its drainage.

How does the density of population compare with that of other states in the middle west? With New York? With Rhode Island?

What position does Ohio hold as a producer of maple syrup? Tobacco? Wool?

How does the value of Ohio's manufactures compare with that of agriculture and mining?

What is the leading manufactured product? Name five other important manufactures.

What can you say of the transportation facilities?

How many states touch Ohio? What are its water boundaries?

What is the state's rank in area? Population?

What percentage of the people of Ohio are whites of native birth?

lipolis became the second settlement. White inhabitants in the southern part of the territory increased rapidly. Late in 1794 a victory was gained by Gen. Anthony Wayne over the Indians, at "Fallen Timbers" on the Maumee River, and the next year a treaty of peace was concluded, the Indians ceding a great portion of the territory, which settlers began at once to fill. Chillicothe was made the seat of government for the territory, and the legislature first met in 1799. Indiana was set off from Ohio in 1800, and in 1802, a constitution was adopted for the latter. On February 19, 1803, Ohio was admitted into the Union.

A number of Indian chiefs, some of them nationally famous, are connected with Ohio's history. Cornstalk, a Shawnee, was born in 1720, he was treacherously killed by the whites while on a peace mission in 1774. Little Turtle aided in the defeat of St. Clair at Fort Recovery in 1791 and signed the Greenville Treaty. Logan was a Mingo chief who delivered the memorable oration under the Logan Elm in Pickaway County. Pontiac was the Ottawa chief who led the great conspiracy of 1763 for driving the whites out of the country. Tecumseh was a Shawnee, a great personality, a wise and brave man, said by many to be the greatest man of his race.

There have been 20 national grants, reservations and sales of land in Ohio. The Ohio Company of Massachusetts bought nearly one million acres in 1787. Connecticut reserved nearly three million acres when ceding her claims to territory. Some 500,000 acres were given to citizens of Connecticut to cover losses by fire during the Revolution. More than 4,000,000 acres were given to Virginians who served in the Revolution. The U. S. Military Lands, 2,500,000 acres, were given to soldiers of the Revolution. The government set apart 704,000 acres for public school purposes. To the British subjects in Canada who sympathized with the Revolution were given 100,000 acres.

Slavery was forbidden by law and the immigrants who sought homes in the state came from the north. The Democrats were in power usually until the slavery issue was forced to the front following the Mexican War. Since 1852 the state has voted Democratic in the national elections three times. But in the election of governors the two dominant parties have shared honors with

the Democrats in power one-third of the time. The state has held a high place in the councils of national politics.

In 1912 the state constitution was revised under the influence of progressive leaders in both parties, 34 amendments were adopted in the popular vote. In this way the legislature gained the right to levy inheritance, income and franchise taxes and taxes on coal, oil, gas and other mineral products. The initiative and the referendum were introduced. A teachers' retirement system was adopted in 1919. Compulsory insurance of workmen is in force, by 1928 1,600,000 employees were insured against accidents.

The administrative departments of the state government have been reorganized and consolidated. A magnificent office building accommodates the greatly enlarged personnel required to carry on state affairs.

The great floods of 1913 in the valleys of the Miami, Scioto and Muskingum necessitated herculean engineering undertakings for flood control. The expenditures for the several dams and auxiliary measures amounted to \$341,000,000.

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CITIES		
Akron	Elmira	Newark
Alliance	Findlay	Norwood
Ashtabula	Fostoria	Piqua
Bellaire	Freemont	Portsmouth
Cambridge	Hamilton	Salem
Canton	Ironton	Sandusky
Chillicothe	Lancaster	Springfield
Cincinnati	Lima	Steubenville
Cleveland	Lorain	Tiffin
Columbus	Mansfield	Toledo
Conneaut	Marletta	Warren
Coshocton	Marion	Xenia
Dayton	Massillon	Youngstown
Delaware	Middletown	Zanesville
East Liverpool	Mount Vernon	

RIVERS		
Ohio	Maumee	Scioto

HISTORY		
Northwest Territory	Ordinance of 1787	
Ohio Company	Wayne, Anthony	
UNCLASSIFIED		
Mound Builders	Tecumseh	
Pontiac	Western Reserve	
Rockwood Pottery		

OHIO COMPANY, the name applied to two organizations formed to colonize the Ohio River Valley. The first, in 1749, was an association of London merchants and Virginia colonists, among the latter were two brothers of George Washington. George II granted this company a tract of 500,000 acres south of the river, but beyond the surveying of part of the land nothing came of the enterprise. The second company, known as the Ohio Company of Associates, was organized at Boston in 1786 by Rufus

Putnam, Manasseh Cutler (which see) and other colonials. This company purchased several thousand acres on the north side of the Ohio, and in 1788 founded Marietta, the first settlement within the present limits of Ohio. See OHIO, subhead *History*.

OHIO RIVER, one of the most important commercial rivers of the United States. It is formed at Pittsburgh, Pa., by union of the Allegheny and Monongahela rivers, and at this point it is a navigable stream 600 yards wide. It flows first northwest, then southwest, separating Ohio from West Virginia, in its further course it separates Kentucky on the south from Ohio, Indiana and Illinois, entering the Mississippi at Cairo, Ill., after a course of almost 1,000 miles. Its drainage basin is estimated at about 210,000 square miles. The river is navigable from Pittsburgh to Cairo except in the extreme dry season and in the coldest winter weather. The principal tributaries are the Muskingum, the Miami, the Wabash, the Great Kanawha, the Big Sandy, the Licking, the Green, the Cumberland and the Tennessee rivers. The latter is the most important.

OHIO STATE UNIVERSITY, established in 1870 by the state legislature as an agricultural and mechanical college, became the state university in 1878. It is well located in the western part of Columbus, the capital city of the state. Within the university organization are ten colleges, and on Gibraltar Island, in Lake Erie, acquired by gift, a biological laboratory is maintained. The faculty numbers about 1,000, enrollment exceeds 13,000.

OHM, ome Every conductor offers a certain degree of resistance to the flow of an electric current, in much the same way as the friction of a pipe resists the flow of water through it. The *ohm* is the unit of electrical resistance. It is equivalent to the resistance offered by a column of mercury 106.3 centimeters long and one square millimeter in cross section at the temperature of melting ice. This would be a column of mercury the size of that in an ordinary thermometer tube, 40.84 inches long, at 32° F.

OHM, GEORGE SIMON (1787-1854), a German physicist. He became successively professor of physics at Cologne, director of the Polytechnic at Nuremberg and professor of physics at the University of Munich. He wrote a number of important scientific works and was the discoverer of what in physics is known as "Ohm's Law" (see next column).

OHM'S LAW, an important law of physics discovered by Professor Ohm, to the effect that the intensity of an electric current in a circuit is proportional to the electromotive force and inversely proportional to the resistance. In concrete terms, the number of amperes flowing in a circuit is equal to the number of volts divided by the number of ohms. See **ELECTRO-MOTIVE FORCE**.

OIL CITY, PA., in Venango County, 132 miles north of Pittsburgh, on the Allegheny River, at the mouth of Oil Creek, and on the New York Central, the Pennsylvania and the Erie railroads. It is the center of the great oil region of western Pennsylvania and has large refineries, barrel works, foundries, machine shops and manufactures of boilers, engines, oil well supplies and other articles. The city has a Y M C A and a sanitarium. The commission form of government was adopted in 1911. Population, 1930, 22,076.

OIL/CLOTH, a heavy woven waterproof material used chiefly as a covering for floors that require frequent washings. The foundation, a sort of canvas or burlap, is stretched on a frame and treated with a mixture of glue, rye flour, tobacco and varnish. It is then dried, rubbed with pumice and painted. An ornamental design is usually stamped on it. Floor oilcloth has been almost superseded by linoleum, a similar material, which is much heavier and more durable. Lightweight oilcloth is much used as a covering for kitchen tables, pantry shelves and such places. See **LINOLEUM**.

OIL PALM, a genus of palms, akin to the coconut palm, found chiefly in tropical Africa. One species produces fruit in large clusters, containing about 150 orange-colored drupes having an oily pulp. The oil from this pulp is exported and is much used in making candles and toilet soaps. When chilled, it hardens like butter, for which it is sometimes eaten as a substitute, when fresh.

OILS, sticky or viscid substances formed within living animal or vegetable organisms and having a variety of uses. They are liquid at ordinary temperatures, insoluble in, and lighter than, water, taking fire when heated in air and burning with a more or less luminous flame. The oils are usually divided into the fat, or fixed, oils, and the volatile, or essential, oils. Another division recognizes vegetable oils, by far the most numerous class, animal oils and the mineral oils (petroleum, naphtha).

Fat, or fixed, oils are subdivided into the *drying* and the *non-drying oils*. The former class includes all oils which, through the absorption of oxygen, thicken when exposed to the air and are converted thereby into varnish, as, for example, linseed and hemp-seed oil. The most important of the drying oils are linseed, hemp, walnut, poppy, candle nut, sesame, sunflower, madia and safflower. All the drying oils are of vegetable origin. The *non-drying oils* (partly of vegetable, partly of animal origin) when exposed to the air also undergo a change, resulting in the formation of acrid, disagreeably smelling substances. Though these substances thicken, they do not become dry. The fixed vegetable oils are generally prepared by subjecting the seeds of the plant to pressure, with or without heat, but they may also be extracted by means of certain solvents. Of the non-drying oils the chief are olive, cottonseed, colza, rape, ground nut, castor and croton.

Volatile oils are generally obtained by distilling with water the plants which afford them. They are acrid, caustic, aromatic and limpid and are mostly soluble in alcohol, forming essences. They boil at a temperature considerably above that of boiling water, some of them undergoing partial decomposition. A few of them are hydrocarbons, the greater number, however, contain oxygen as one of their elements. They are chiefly used in medicine and in the manufacture of perfumery, and a few of them are extensively employed in the arts, as vehicles for colors, and in the manufacture of varnishes, especially oil of turpentine. They are very numerous, among them being the oils of anise, bergamot, clove, cinnamon, cajuput, lavender, lemon, lime, orange, mint, peppermint, nutmeg, marjoram, rosemary and thyme.

Animal oils are, for the most part, the fluid parts of the fat of the animal and are separated by heat alone. The animal oils comprise neat's foot oil, train oil, seal oil, sperm oil, porpoise oil, cod-liver oil and shark oil. Many are used as articles of food, some are medicines and some are used extensively in the arts. *Vegetable fixed oils* all consist of one or more peculiar principles. Thus, olive oil contains chiefly olein, with a little stearin, linseed oil is composed mainly of hrolein. A certain number of the vegetable oils are also known as vegetable fats, from their consistency at ordinary temperatures, such as palm oil, cocoanut oil, shea-butter.

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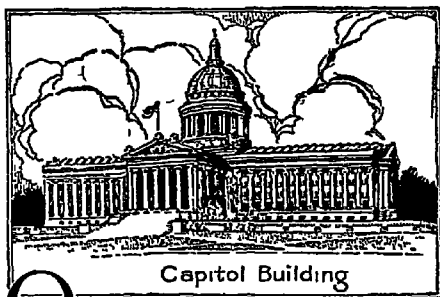
Castor Oil	Linseed	Perfumes
Cocoanut	Olive Oil	Petroleum
Cod-liver Oil	Painis	Sperm Oil
Cottonseed	Palm Oil	Turpentine
Products		Varnish

OINTMENT, a preparation having a fatty substance as a base, used as an external remedy for bruises, sunburn, sprains, etc. Vaseline (which see) is a trade name for one of the most widely used ointments. It is made of petrolatum, the residue from the distillation of petroleum. Cosmoline and petroleum jelly are other ointments made from petrolatum. Lard is also a base of ointments, of which twenty-four are recognized by the United States Pharmacopoeia. Other ingredients used include olive oil, almond oil, spermaceti, wax, benzoin, zinc, sulphur and rose water. Ointments used as beautifiers are usually marketed under the name of cold cream.

OJIBWA, *o jib'wa*, an Indian tribe belonging to the Algonquian family. The former home of the Ojibwas was a great region in the vicinity of Lake Superior. At present there are about 30,000 of these Indians on reservations in Northern United States and Canada. They are tall, active and well built, skilled hunters and fishers, and prone to retain their primitive manners and customs. Originally they possessed a comprehensive mythology and ritual.

OKAPI, *o kah'pe*, an animal of the giraffe family. Its drooping hind quarters, short tail and shape of head are like the giraffe's, but its neck and legs are shorter than those of the latter animal. Except the front and sides of the face, which are yellowish-white, and the legs, which are alternately barred with black and white, the animal is a warm purple, touched with sepia. Protected with this coat, it cannot be distinguished at a distance of twenty paces from the dense, dark foliage in the twilight gloom of the equatorial Congo forests where it makes its home. It feeds on plants, and has the large ears peculiar to forest creatures. The male is equipped with short, dagger-shaped horns.

OKHOTSK, *o'hotsk*, SEA OF, an arm of the Pacific Ocean. It cuts into the eastern coast of Siberia and is nearly enclosed by the peninsula of Kamchatka, northeast of it, Sakhalin Island, southwest, the island of Hokkaido, south, and the long chain of Kurile Islands, which extend from the last named to Kamchatka.



OKLAHOMA, a prosperous state of the Middle West. It is composed of two former territories, Oklahoma and Indian Territory, which were united by Act of Congress when the state was admitted to the Union in 1908. Its popular name, The Boomer State, was bestowed as a tribute to its remarkable development. When the region was first opened freely to white settlement, towns literally sprang up in a day, the industrial growth thereafter was not only rapid, but it was permanent. The name of the state is taken from the Choctaw language and means Red People.

Location and Size Oklahoma belongs to the south-central group of states and is situated about midway between the Atlantic and Pacific oceans. It touches six other states. In the northwest there is a narrow strip of land extending 169 miles east and west and 35 miles north and south, it lies between New Mexico on the west and the hundredth meridian on the east, Texas forms its southern boundary and Colorado and Kansas adjoin it on the north. This narrow strip of Oklahoma is called the *Panhandle*. The main body of the state is bounded on the north by Kansas, on the east by Missouri and Arkansas, on the south and west by Texas with the Red River as the natural boundary between Oklahoma and Texas. This, the larger section of the state, extends 310 miles from east to west, the eastern boundary of the state is 213 miles long.

With a total area of 70,057 square miles, Oklahoma is seventeenth in size among the states of the Union. It is a little larger than all of New England. Texas, the largest state, is nearly four times the size of Oklahoma. It is very nearly the same size as North Dakota or Missouri.

The People In population the state ranks twenty-first in the Union, with 2,396,040 in-

habitants, an average of 34.5 to the square mile, an increase of about eight per cent in 10 years. Native whites are by far the most numerous element in the population, but there are 172,198 Negroes and 95,000 Indians in the state. Of the latter some 56,000 are full-blood. In Oklahoma live the Five Civilized Tribes—the Cherokee, Chickasaw, Choctaw, Creek and Seminole Indians—who are prosperous and well-educated American citizens. Thirty per cent of the Indians in the Union live in Oklahoma.

Fully three-fifths of the people belong to no organized church. Of the church members the Methodists are the most numerous, with Baptists a close second. Next in order are Roman Catholics, Disciples of Christ, Presbyterians and Episcopalians.

Cities In 1930 there were sixteen cities in Oklahoma having populations in excess of 10,000. The principal ones were Oklahoma City, the capital (185,389), Tulsa (141,258), Muskogee (32,026), Enid (26,399), Shawnee (23,283), Okmulgee (17,097), Ponca City (16,136), Ardmore (15,741), Bartlesville (14,763), Chickasha (14,099), Lawton (12,121), McAlester (11,804).

Surface and Drainage The northeastern section north of the Arkansas and Canadian rivers is a plateau deeply cut by the streams which flow across it. In the central part of this plateau, those portions occupied by the Cherokee and Creek nations, there is a large area of open prairie country. The southeastern part, south of the Canadian River, is broken by hills, which enter it from Arkansas. These vary in altitude from 2,500 feet, on the Arkansas border, to about 1,000 feet, in the south-central part of the state. The hills and intervening valleys of this section are very heavily wooded. From the central part of Oklahoma westward, the surface consists almost wholly of rolling plateau, rising from an altitude of 800 feet in the center to 2,500 feet on the northwestern boundary, and 4,500 feet in the extreme western part of Beaver County. Western Oklahoma belongs properly to the region of the great plains.

The larger part of Oklahoma is drained by the Arkansas River, which flows across the northeastern section, and by its leading tributaries. The most important of these is the Canadian, which enters the state near the center of the western boundary and flows easterly, uniting with the Arkansas a few

miles west of the eastern boundary The Beaver River from the Panhandle and Wolf Creek from Texas unite to form the North Fork of the Canadian which flows in an easterly-southeasterly direction until it joins with the main stream a few miles west of its confluence with the Arkansas

North of the North Fork the Cumarron River flows nearly parallel with it, in the northeastern corner are the Verdigris and the Neosho rivers, flowing southerly into the Arkansas The most important stream in the southern part of the state is the Washita which unites with the Red River a little east of the midway point of the southern boundary The Red River and its minor tributaries drain the southern part of the state Oklahoma contains no lakes of importance

Climate The climate is warm-temperate In general it is mild, both in summer and winter, although in the midst of the summer periods of extreme heat occur during which the thermometer has been known to rise as high as 115°. Severe cold weather is seldom known, the winters are mild and salubrious In general the mean temperature for July is about 81°, and for the entire year, about 60° The rainfall in some districts reaches 57 inches but in the extreme west falls as low as 20 inches or less, however, rains are quite evenly distributed throughout the year and except in the extreme western part are sufficient for agricultural needs In the western third of the state and in the Panhandle droughts sometimes hinder the growing crops

Mineral resources Oklahoma has attained notable distinction in the production of petroleum with average yearly outputs of about 185,000,000 barrels Oil was first produced in quantity in 1904 with a yield of 1,400,000 barrels Within ten years the production increased to nearly 107,000,000 barrels, valued at over \$56,700,000 Nearly one-fourth of the country's 100,000 miles of pipe line are to be found in Oklahoma

The interest aroused by oil production has tended to overshadow the commercial importance of coal development, though this mineral ranks third in value Most of the coal mining is carried on in Pittsburgh, Coal, Okmulgee and Latimer counties, the coal fields which are an extension of the Kansas and Arkansas areas cover 12,000 square miles The annual output is about 14,000,-

000 tons Natural gas is second in rank and in its production Oklahoma is surpassed only by Texas The annual output has risen to as high as 357,893,000,000 cubic feet, but normally ranges from 250,000,000,000 to 350,000,000,000 cubic feet In the northeastern part there is a profitable lead and zinc region, a continuation of the mineral field of southwestern Missouri Other minerals worked include limestone, asphalt, gypsum, salt, and gravel

An example of mineral developments may be taken from the northeastern corner of Ottawa County which lies in the Quapaw Indian Reservation Lead and zinc mining began in 1902 Additional productive areas were opened in 1907, the Pilcher field was discovered in 1914 After 1917 the output increased enormously and at last amounted to 70 per cent of the production received from the mineral area which reached into three contiguous states

More than 5,900 acres were covered by the mining leases, from this region the output in one year exceeded 49,000 tons of lead and zinc concentrates The royalties paid to the Indians were in excess of \$120,000

Agriculture Farming is the leading industry in the state, its development has been very rapid since 1890 Over half of the land area is devoted to farms, and about two-thirds of the farm land is improved About two-fifths of the total number of farms are between 100 acres and 174 acres in area Some white farmers are leasing their holdings from the original owners—the Indians Before the era of white settlement large sections of the state, especially in the west, were utilized as cattle ranges, Oklahoma is still an important livestock state

Among farm crops wheat is often first in point of acreage with about 4,000,000 acres devoted to this cereal that yields an annual value of \$50,000,000 Cotton ranks first in value and somewhat surpasses corn in point of acreage, Oklahoma is one of the four great cotton states The annual crop is approximately 1,000,000 bales of 500 pounds each Corn, the second cereal in value, is grown on 3,000,000 acres Over 1,150,000 acres are devoted to oats, and about 600,000 acres to hay, alfalfa being an important fodder crop Potatoes are next in rank, other important products are sweet potatoes, sorghum, tobacco, flowers and nursery products,

orchard fruits, grapes and watermelons

Manufactures. Manufacturing is developing at a normal rate, and is influenced considerably by the natural resources of the state, notably by the supply of fuel in the form of oil and coal. Oil refining, manufacture of flour and grist-mill products, cotton ginning, production of cottonseed oil and cake, smelting and refining zinc, the manufacture of lumber and timber products, printing and publishing and dairying are the principal industries.

Transportation and Commerce. Trunk lines of railways traverse the state from east to west, from north to south and from northeast to southwest. Some 6,800 miles of railway connect all of the important towns of the state with the following as the important railway centers: Muskogee, McAlester, Tulsa, Oklahoma City, Chickasha, Guthrie and Enid. The railroads having the longest mileage are the Saint Louis & San Francisco, the Chicago, Rock Island & Pacific, the Atchafalaya, Topeka & Santa Fé and the Missouri, Kansas & Texas. There are 350 miles of electric railway in Oklahoma. The rivers are not navigable so that the inland towns rely on the 5,307 miles of improved highways in finding outlets to the railroads. The people of Oklahoma own a half million automobiles. There are more than 24 airports, two transcontinental air routes and over 10 bus lines cross the state. The commerce of the state considering its population and period of development is flourishing and unusually large. The exports consist of petroleum, corn, cotton, live stock, and lumber, together with other agricultural products, the imports are almost entirely manufactured goods.

Education. On the organization of the state, Oklahoma established an excellent system of public schools under the supervision of a superintendent of public instruction and a state board of education. Public education is maintained by a school fund and by taxation with the annual expenditure of about \$25,000,000. The system includes elementary schools, high schools in cities and large towns and in counties having 6,000 or more inhabitants, and six teachers colleges at Edmond, Talequah, Ada, Durant, Weatherford and Alva. The higher institutions of learning include the University of Oklahoma at Norman, the Agricultural and Mechanical College at Stillwater, Phillips University at

Enid, Bethany-Peniel College at Bethany, Catholic College of Oklahoma for Women at Guthrie, Oklahoma Baptist University at Shawnee, Oklahoma College for Women at Chickasha, the Panhandle Agricultural College at Goodwell, the University of Tulsa at Tulsa, and the Colored Agricultural and Normal University at Langston. The junior colleges are ten in number.

Other Institutions. Institutions of all kinds number 553, of these 20 belong to the state. The state orphanage at Pryor, hospitals for the insane at Vinita, Supply and Norman, an institute for the feeble-minded at Enid, the state university hospital at Oklahoma City, the deaf, blind and orphan home at Taft, the Union soldiers' home at Oklahoma City and the Confederate soldiers' home at Ardmore, the state penitentiary at Ardmore with the industrial schools and reformatories make up the list of state institutions.

Government. The constitution of 1907 was called by President Taft a code of laws, it is markedly different from the constitutions of most of the states in that many of its original clauses are the kind that are usually adopted through legislative action or by subsequent amendment. It provides for the initiative and referendum. Amendments may originate among the people or in either house of the legislature, to become effective they must have the approval of both houses and of the electorate. The executive department comprises the governor, lieutenant-governor, secretary of state, auditor, attorney-general, treasurer, superintendent of public instruction, commissioners of labor, charities and corrections, and insurance, mine inspector and state examiner, all elected for terms of four years. The governor, secretary of state, auditor and treasurer cannot directly succeed themselves.

The legislature consists of a senate of not more than forty-four members, elected for four years, and a house of representatives of 110 to about 120 members, elected for two years. The judicial power is vested in a supreme court, district, county and municipal courts and justices of the peace. The chief justice and eight judges of the supreme court are elected for six years. There are thirty-one judicial districts in each of which there is a judge elected for four years. County judges are elected for two-year terms.

Items of Interest on Oklahoma

The Panhandle, originally a part of Texas, was cut off from it when Texas entered the Union, and for many years it belonged to no state or territory. From this circumstance came its former name of *No Man's Land*. In 1890 it was made a part of Oklahoma Territory.

In the northwest are four large salt plains, almost perfectly level, covered with snow-white salt crystals, and containing many salt springs. These are the Big Salt Plain of the Cimarron River, the Little Salt Plain, the Salt Creek Plain, and the Salt Fork Plain.

Characteristic wild animals are the black bear, puma, coyote, timber wolf, fox, antelope, squirrel, rabbit and prairie dog.

Hawks, turkey buzzards, wild turkeys, prairie chickens and quail are common.

The most common trees are oak and cedar of various species, pine is confined to the more mountainous parts in the east and the black walnut is found in the river bottoms, ash, pecan, sycamore, elm, maple and hickory occur but are of little commercial importance.

The prevailing soil is a dark-red loam, made up of decomposed sandstone or limestone, the river valleys often have rich deposits of alluvium.

Before the first opening to settlement in 1889, Oklahoma was largely occupied by great herds of cattle driven in from Texas.

Two crops of potatoes may be grown on the same ground in one year.

Eight per cent of the legal voters have the right to propose any legislative measure, and fifteen per cent to propose amendments to the constitution by petition. The referendum applies both to municipalities and to the state.

Indians who have severed tribal relations may qualify as voters. There are many thousands of these.

Oklahoma is represented in Congress by two Senators and nine members of the House of Representatives.

Nearly one-fourth of the 26,700 for-

eign-born are Germans, they outnumber the Russians almost two to one, and the Italians five to one.

The mistletoe is the state flower.

The Panhandle is a rough table-land among the foothills of the Rocky Mountains.

The Creek and Seminole Indians sold lands to the government in an early day, the first at 30 cents an acre and the second at 15 cents an acre.

Thomas P. Gore, the blind statesman, served as United States senator from 1907 to 1921 and was reelected in 1930.

Questions on Oklahoma

Why is Oklahoma called the "Boomer State?"

What and where is the section called the *Panhandle*?

How many states each the size of Rhode Island could be placed in Oklahoma? How many Oklahomas could fit into Texas?

How does the water surface of Oklahoma compare with that of Minnesota? South Carolina? Ohio?

How many persons to the square mile are there in the state? What proportion are Negroes? Full-blood Indians?

Who are the Five Civilized Tribes?

What denomination has the most adherents among Protestants?

How many cities of more than 10,000 inhabitants are there in Oklahoma?

Describe the surface and drainage.

What is there unique about the constitution of Oklahoma?

By whom must amendments be approved?

What state officers may not succeed themselves directly?

How did President Taft characterize the Oklahoma constitution? Why?

What name did the Panhandle formerly bear?

How many states entered the Union ahead of Oklahoma?

How does the state rank in size? In population?

Three county commissioners administer affairs in each county, cities of 2,000 and more inhabitants may frame plans for city government subject to the state laws. Among the subjects covered by progressive laws passed by the legislature are the following: regulation of child labor, providing for mother's pensions and workmen's compensation, sterilization of criminals, sales tax, deferring foreclosure of mortgages.

History The movement of Indians from the east to western territories began when the Cherokees in 1809 requested permission to occupy hunting grounds west of the Mississippi River. By successive treaties and agreements the Cherokees, Creeks, Seminoles, Choctaws and Chickasaws acquired holdings in the region called Indian Territory after 1834.

Circumstances led the government to demand the consent of these tribes to share their lands with the Sac, Fox, Osage, Kansas, Pottawatomies, Shawnees, Wichitas and others. These assignments were accomplished by 1867.

This region was set apart for these Indian tribes with the guarantee that within this domain they should be allowed to exercise their tribal form of government and remain undisturbed. Most of these tribes established forms of government similar to the government of the states, but the region assigned was much larger than they could occupy with profit, and several attempts were made by white adventurers to settle upon the portion of the territory, that afterwards was erected into Oklahoma Territory. Since this could not be done without gaining the consent of the Indians, this portion of the region was purchased from them by the government and in 1889 was thrown open to settlement.

The opening of Oklahoma Territory witnessed the most remarkable rush for land ever known in America. More than 50,000 people entered the territory and filed claims on the day of the opening. Cities arose in a night. The next year (May 2, 1890) the territory was organized. From the date of opening, Oklahoma continued to prosper, and its increase in wealth and population was beyond precedent. Just before the final adjournment of the Fifty-ninth Congress, in 1906, an enabling act, combining Oklahoma and Indian Territory and providing for their admission into the Union as one state,

was passed. This did no violence to the Indian tribes within the state, since, in accordance with a previous arrangement with the government, tribal relations ceased in Indian Territory in 1906. The state constitution and also a prohibition amendment to the constitution were adopted at a general election held on September 17, 1907. The "grandfather's clause" restricting the right of Negroes to vote adopted in 1910 was declared unconstitutional by the United States Supreme Court. The state has usually voted Democratic with a vigorous Republican minority. Two governors have been removed from office under charges of misgovernment.

Related Articles Consult the following titles for additional information:

GEOGRAPHY

Ardmore	Enid	Red River
Arkansas	Guthrie	Sapulpa
(river)	McAlester	Shawnee
Canadian River	Muskogee	Tulsa
Chickasha	Oklahoma City	

HISTORY

Cherokee	Five Civilized Tribes
Chickasaw	Grandfather's Clause
Choctaw	Indians, American
Creeks	Seminole

OKLAHOMA, UNIVERSITY OF, a university established in 1892 by act of the territorial legislature; it later became the state university. The institution maintains colleges of arts and sciences, engineering, business administration, fine arts and education, also schools of medicine, pharmacy, law and nursing, a graduate school and an extension division. The state departments of biology and geology have headquarters at the university. The student enrolment normally reaches about 7,000, the faculty numbers about 300.

OKLAHOMA CITY, OKLA., the capital and largest city of the state, the county seat of Oklahoma County. It is situated on the North Fork of the Canadian River and on the Atchison, Topeka & Santa Fé, the Chicago, Rock Island & Pacific, the Saint Louis & San Francisco, the Fort Worth & Western, the Missouri-Kansas-Texas and several interurban railway lines.

The surrounding territory is fertile, producing wheat, corn, cotton, broom corn, alfalfa, fruits, cattle and hogs.

Over 500 manufacturing plants include flour mills, ice factories, packing houses, foundries, elevators, cotton gins, oil mills and compressors, brickyards and other factories. The stockyards can handle more than 31,000 head of cattle daily. Headquarters of many of the largest oil companies of the

state are located here Building permits in one year rose to \$16,000,000 in value Over \$9,000,000 is invested in the public schools

The city has erected modern buildings of large dimensions and of the best materials. The state capitol was completed in 1917 at a cost of \$4,500,000 Other important structures are the Federal building, the Carnegie library, the state medical school, Oklahoma City University, and a school for girls The state university and a state teachers college are less than twenty miles distant There are eight hospitals and 100 churches

The city parks contain over 2,300 acres and are connected by a boulevard system. The state fair grounds occupy 160 acres. Natural gas, available in almost unlimited quantities, is largely used for heating purposes Ample water supply is furnished by Lake Overholser, ten miles from the city, a reservoir that cost \$6,000,000. The city manager form of government has been adopted The population increased 540 per cent from 1900 to 1910, population, 1930, 185,389, an increase of 100 per cent in ten years

OKRA, a vegetable extensively cultivated in the southern part of the United States, where it was introduced from the West Indies The plant can be made to grow readily in all subtropical climates The mucilaginous pods are served as a vegetable and are used to thicken chicken soup, called chicken-gumbo In India the stalks are used for making an inferior quality of rope

OLD AGE PENSIONS, a regular allowance paid to old persons to prevent them from becoming a financial burden upon their relatives or the state In many cases employers retire aged persons on a pension; teachers in half of the states are obligated to become members of a pension system, the government gives pensions to disabled soldiers and sailors and their widows But social legislation includes a plan to give pensions to other citizens when they reach the age of 60 or 65 or 70 More than 20 states in the Union have adopted some such plan, in at least 17 states entrance into the plan by citizens of the state is enforced Pensions are paid to citizens only, the period of residence in the nation and state and the period of prior citizenship vary widely, in some cases being as high as 35 years The financial resources of the pensioners are also weighed; Idaho specifies that the applicant's

income must be not over \$300 annually. The amount of money available under the law is very often one dollar per day. Usually the county contributes all or a part of the funds spent on old age pensions

Movements to promote old age pensions originate when there are large numbers of persons dependent on private social agencies for support According to a report of the Secretary of Labor the number of unemployed in the United States has been as high as 16,000,000, laws for old age pensions are more easily passed under such conditions Furthermore, the example of England, the British dominions, Denmark, France, Norway, Germany and a dozen other European states is also very influential on American leaders in social legislation Cooperation between state and national governments with contribution of funds by both employers and beneficiaries are effective measures for financing social insurance

The first national enactment providing for old-age pensions in the United States passed Congress in 1935, under the name Social Security Act It includes not only old-age pension provisions, but also benefits for blind persons, crippled and dependent children, maternal and child welfare, and for unemployment compensation Provision is made for old-age pensions from the age of 65 to those who are dependent upon public support The Federal government joins the states in supplying the pension funds, the national treasury appropriating \$15 per month in every case where the state appropriates a like amount Funds are to be derived from taxes upon labor's income and from assessments (taxes) upon employers

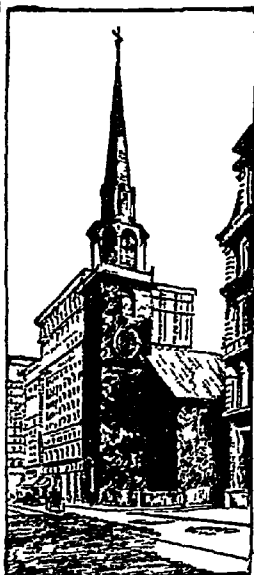
The varied plans adopted in foreign countries are of considerable interest In New Zealand and Australia the beneficiaries do not contribute to the pension fund, men are pensionable at the age of 65 and women at 65 in Australia, and at 60 in New Zealand In Canada the Dominion government agreed to pay one-half the cost of pensions in any province which adopted an approved scheme, the pensions are payable at the age of 70 In England all men and women may draw a pension at the age of 65 under certain restrictions which are no longer binding at the age of 70 when payments are made without regard to private income

OLD POINT COMFORT, a favorite watering place of Virginia, situated at the mouth

of the James River, near the southern end of Chesapeake Bay, and twelve miles north of Norfolk. It is on the Chesapeake & Ohio and the New York, Philadelphia & Norfolk railways. Because of its equable temperature, being cool in summer and warm in winter, this is one of the most desirable resorts on the Atlantic coast, and it is frequented by large numbers of tourists.

OLD RED SANDSTONE, the popular name of what geologists call the Devonian System, from Devon, England, where the largest beds have been found. This formation includes white, yellow and green beds of shale, conglomerate, clay and limestone and a predominating intermixture of red sandstone. The name "Old Red Sandstone" was first used in popular treatments of geology by Hugh Miller, whose books were at one time widely read. See GEOLOGY, DEVONIAN SYSTEM.

OLD SOUTH MEETING HOUSE, one of the most famous of American historic buildings. It was built in Boston in 1730, on the site of an earlier church erected in 1669 on land owned by John Winthrop. In the stirring times before the Revolutionary War the church was the scene of many notable public gatherings, and it came to be known as the "Sanctuary of Freedom." In it was held the great public meeting which preceded the Boston Tea Party. When the British occupied Boston it was used by them as a riding school. The building now serves as a museum of historical relics and as an auditorium for lectures upon historical and patriotic subjects. It is much visited by tourists.



OLD SOUTH MEETING HOUSE

OLEAN, *o le an'* N Y, in Cattaraugus County, seventy miles southeast of Buffalo and five miles from Pennsylvania, on the Allegheny River, at the mouth of the Olean Creek, and on the Erie and the Pennsylvania railroads. There are two landing fields. It is in a region containing oil fields, and it has oil refineries, tanneries, lumber mills, railroad shops, glassworks, flour and silk mills and other factories. The city contains a Carnegie Library, a state armory, Saint Bonaventure College, seven parks, and Bradner Stadium. A feature of interest in the vicinity is a massive collection of conglomerate rocks known as Rock City. The place was settled in 1804, and was chartered as a city in 1893. The city is governed on the mayor-council plan. Population, 1920, 20,506, in 1930, 21,790, a gain of 6 per cent.

OLEANDEER, a plant, known also by the name of *rose bay*, which is a beautiful evergreen shrub, belonging to the dogbane family. It produces large clusters of pink or white, rose-like flowers, and has long, narrow glossy leaves. The plant, especially the bark of the root, is poisonous.

OLEOMARGARINE, *o le o mah' ga reen*, a butter substitute which has as its basic ingredients neutral lard, oleo oil extracted from beef-fat, and vegetable oils, such as cottonseed and palm oil. Coloring matters, notably annatto and yellow coal-tar dye, are usually added, and the mixture is also churned in milk and cream. These latter processes are for the purpose of imparting to oleomargarine the flavor and appearance of genuine butter. The product is finally worked, salted and packed for the market.

Oleomargarine of good quality is nutritious and wholesome, and there is no objection to its use if the purchaser knows that he is buying a butter substitute. To protect the consumer the United States government imposes a ten-cent tax on every pound colored to look like butter, and a tax of one-fourth of a cent on every pound uncolored. Foreign importations are taxed at the rate of fifteen cents a pound. In 1917 the domestic tax yielded \$1,027,881. Illinois produces about two-thirds of the entire American output. Ohio, Kansas, Missouri and New Jersey are other important producers.

Butterine. This term was formerly applied to oleomargarine of superior grade, but it has fallen into disuse in this sense. In government reports only the term *oleomar-*

garine is used to signify butter substitutes. See BUTTER, ADULTERATION

OLIGARCHY, *ol' gahr ky*. See GOVERNMENT

OLIVE, a fruit tree, of which there are several species. The common olive is a low, branching, evergreen tree, from twenty to thirty feet high, with stiff, narrow, dusky-green or bluish leaves. The flowers, small and white, appear from June to August. The fruit is a plumlike berry of greenish pulp, covered with a thin smooth skin and containing a hard stone. The tree is a native of Syria and it is cultivated in almost every warm, dry climate. The tree grows slowly and lives a long time. As its age increases the trunk becomes gnarled, and twisted into odd shapes, but it continues to produce great quantities of fruit even when it appears to be on the verge of decay.



OLIVE

The wood is yellowish, beautifully streaked with dark lines, and can be brightly polished. It is serviceable in making boxes and small fancy articles. From earliest times the olive tree has been held in veneration throughout the East. Among the Greeks it was sacred to Minerva, and olive wreaths were used by both Greeks and Romans to crown victors. The olive tree is associated with the garden of Gethsemane and with many of the scenes described in both the Old and the New Testaments. To this day it is everywhere recognized as the symbol of peace. California is one of the greatest olive-producing regions of the world.

OLIVE OIL, an oil extracted from the fruits of the olive tree. The olives are taken, as soon as picked, to a press, where they are run through a machine which crushes them into fine pulp. This is packed into short, open-mouthed baskets of rushes, several of which are put together into a press, which squeezes out the oil into tubs half filled with water. The oil remains at the top, and the impurities sink through the water to the bottom. The pulp is gathered together after passing through the press the first time and is usually sent through three times more, each

successive pressure producing oil of a different grade. The oil is filtered and clarified until it becomes a beautiful golden-yellow liquid, suitable for the table. Much oil that is sold as olive oil is peanut oil or cottonseed oil or badly adulterated olive oil.

OLIVES, MOUNT OF, or MOUNT OLIVET, a hill on the east side of Jerusalem, separated from it by Kedron Valley. The summit, divided into four parts by intervening depressions, is about 200 feet above the city. The hill is mentioned several times in the Old Testament, and was the scene of important events in the life of Jesus. Over the road which winds around its southern end He made his triumphal entry into Jerusalem, and upon the mount He delivered one of His sermons (*Mark XXX, 3*). On the western slope lay the Garden of Gethsemane, whither He often withdrew for prayer. Christian tradition names the mount as the scene of His transfiguration.

OLMSTED, *om'sted* or *um'sted*, FREDERICK LAW (1822-1903), an American landscape architect, was born at Hartford, Conn., educated at Yale University and Amherst College. He first engaged in farming, but after several trips to Europe and through his own country, he was appointed landscape architect and superintendent of Central Park, in New York City. During the Civil War he was secretary of the United States Sanitary Commission, and by his personal visits to the camps and his tireless efforts in all directions he succeeded in instituting many measures for the relief of the sick and wounded and for the comfort of the soldiers in the field. He assisted in planning many of the largest parks in the country, including several in New York, Brooklyn, Boston, Montreal, Chicago and Milwaukee, as well as the terraces and grounds of the United States Capitol and several important features of the grounds of the World's Columbian Exposition in Chicago. He was the author of many valuable books upon agricultural methods and upon special phases of landscape gardening.

OLNEY, RICHARD (1835-1917), an American statesman, born in Oxford, Mass. He was graduated from Brown University at the age of twenty-one and studied law at Harvard for three years. Olney was elected to the Massachusetts legislature in 1874 and was a candidate for attorney-general on the Democratic ticket, but he confined himself

chiefly to private practice, where he gained a wide reputation. He was appointed Attorney-General of the United States by President Cleveland in his second term, and in this office he gained fame for his successful effort to break the Pullman strike in Chicago in 1894 by the use of a Federal injunction. Olney became Secretary of State in 1895, on the death of Secretary Gresham. He conducted the negotiations leading to the arbitration of the British-Venezuela controversy and caused wide comment by his firm and vigorous letter of instructions to Ambassador Bayard at London. In 1913 Olney was offered, but declined, the ambassadorship to Great Britain, but in 1915 he became a member of the International Commission under the treaty between France and the United States.

OLYMPIA, *o lim'pi a*, a valley in the district of Elis, Greece, the scene of the famous Olympic games, held in ancient times every four years. There was no town there, but a sanctuary and buildings connected with it. Here were collected thousands of statues of the gods and of victors in the games, treasure houses full of votive offerings, temples, altars, tombs—in short, the most precious treasures of Greek art. Among the buildings were the great temple of Zeus, containing the colossal statue of the god, by Phidias, and considered one of the seven wonders of the ancient world, the temple of Hera, the oldest building at Olympia, the twelve treasure houses, and the building in which the Olympic victors dined after the contests (see **OLYMPIAN GAMES**). Recent excavations have brought to light numerous valuable fragments of sculpture, bronzes, coins and terra cottas. The most important of the sculptures found there is the *Hermes of Praxiteles*.

OLYMPIA, WASH., the capital of the state and the county seat of Thurston County, is on Puget Sound, about 100 miles north of Portland, Ore., and sixty-five miles from the Pacific coast, and on the Northern Pacific and Union Pacific railroads. There is an airport. The city is on a peninsula near the head of the Sound, with mountains on each side of the valley. The chief buildings are the new capitol group, county courthouse, Temple of Justice, a Carnegie Library, a Federal building and two hospitals. The leading manufactures include lumber and lumber products, earthenware, shoes, soap

and other products. Abundant water power is furnished by the Des Chutes River, which in a series of cascades has a fall of eighty-five feet. The first settlement in Washington was made near Olympia in 1848. The town was incorporated in 1859, forty years before Washington became a state. Population, 1930, 11,733.

OLYMPIAD, *o lim'pi ad*, the period of four years between two successive celebrations of the Olympic Games. The Greek historians and writers began to use Olympiad as a convenient system of chronological reckoning about 300 B. C., when they began to date events from the time of the first recorded games, 776 B. C.



Throwing the discus

OLYMPIC GAMES In the year 1896 there was held in Athens, Greece, a great international athletic festival, which was attended by visitors from all over the world. In the various contests amateur sportsmen of many different countries participated, and the event was heralded as tangible evidence of the ties that unite the members of the family of nations. This international meet was a revival of the most prominent and elaborately observed of all Greek festivals, celebrated in honor of Zeus, on the plain of Olympia. The "Sacred Grove," containing the sanctuaries connected with the games, enclosed a beautiful spot 660 by 580 feet in extent, adorned with temples, monuments, altars and theaters, and was crossed by a road called the Pompey Way, along which all the processions passed. Here was located the Olympium, dedicated to the Olympian Zeus. The place also contained a colossal statue of the god, the masterpiece of the sculptor Phidias. At first, only the Peloponnesus patronized the Olympic games, but gradually the other Greek states joined in them. Originally none but those of pure Hellenic blood were permitted to participate in them, but after the conquest of Greece by the Romans the competition became general, and Roman emperors figured among the lists of victors. The games consisted of running, wrestling and other athletic exercises, and the victor was crowned with garlands.

The revival, in 1896, of the Olympic games, after a cessation of exactly 1,500 years (the edict forbidding them having been issued by the Emperor Theodosius in 396), was an event of historic interest and gave the modern Greeks a coveted opportunity to compete with other nations in the field of athletics. The members of the royal family of Greece participated in the festivities and engaged in the competition for prizes, while the king in person distributed the awards. The stadium erected was an exact reproduction of that of Herodius Atticus, and the arena was capable of seating 70,000 spectators. Among the performances was a long-distance foot-race from Marathon to Athens, for which a special amphora, or cup, was given, in memory of the plucky runner of old, who died in bringing to Athens the news of the rout of the Persians.

The games at Athens aroused the spirit of athletic competition throughout the world and the Olympic games have become a permanent feature of international life. At four-year intervals contestants from different countries have gathered to compete for honors in the various events. Games were held at Paris in 1900, at St. Louis in 1904, at London in 1908, at Stockholm in 1912. The meet scheduled for Berlin in 1916 was omitted because of the World War, but the games were resumed with increased enthusiasm, at Antwerp in 1920, at Paris in 1924, at Amsterdam in 1928. The Tenth Olympics, held at Los Angeles in 1932, surpassed all previous events of this nature, in number of contestants (over 2,000) and in record-breaking performances. In track and field events the United States led the field; Japan's swimmers (men) excelled, Italy led in cycling, fencing and gymnastics. The games went to Berlin in 1936.

OLYMPUS, the name given by the ancients to several mountains or mountain chains. There was one in Mysia, one in Cyprus and one, the most famous of all, between Thessaly and Macedonia. This last, which reached a height of over 9,700 feet above the sea level, was the highest mountain in Greece and was in early times regarded as the home of the gods.

OMAHA, NEB., the largest city of the state and the county seat of Douglas County, on the Missouri River, 492 miles west of Chicago.

The city is one of the great railroad cen-

ters, the hub of ten trunk lines—the Chicago, Burlington & Quincy, the Chicago Great Western, the Chicago, Milwaukee, Saint Paul & Pacific, the Chicago & North Western, the Illinois Central, the Missouri Pacific, the Chicago Rock Island & Pacific, the Union Pacific, and the Chicago, Saint Paul, Minneapolis and Omaha railroads. Electric lines reach Council Bluffs, several motorbus lines are in operation and a municipal airport and an army landing field are adjacent. A dozen important highways serve Omaha, with a paved road to the east coast. Omaha is the distributing point of such products as meats, dairy commodities, grain and smelter products, ice machines, sugar, and railroad supplies. Shipments of cattle, sheep and hogs amount to 15,000,000 head in a year. The daily capacity of the flour mills is 5,000 barrels.

The principal buildings and institutions include 60 public schools valued at over \$20,000,000, Creighton University, the Municipal University of Omaha, the medical school of the University of Nebraska, the Joslyn Memorial Art Institute, the Federal building, 190 churches with over 100,000 members, nine hospitals, and the Medical Arts Building. Omaha is the see of both the Roman Catholic and the Protestant Episcopal churches.

Omaha's 45 parks cover 2,100 acres and are connected by 65 miles of boulevards. The Community Playhouse owns its building and presents nine plays each year. The Omaha Symphony Orchestra ranks among the ten best in the country. Nearly 300 conventions with 50,000 delegates meet annually in Omaha. The Ak-Sar-Ben race track accommodates 20,000 spectators.

Lewis and Clark mention the Omaha plateau as a camping ground in 1804, but the first licensed Indian trading post was not established until 1825.

The name of the city means "above all others on the stream." The original town site was platted in 1854 and the city was incorporated three years later. The present corporation embraces two cities and six villages of former times.

Telegraphic and railway connections were established in 1861 and 1863 and meat packing began as early as the railroads could handle the shipments. For thirteen years Omaha was the capital of the territory and of the state. Population, 1930, 214,006.

OMAN, *o mahn'*, a sultanate in the south-eastern part of Arabia, partly on the Persian Gulf and partly on the Indian Ocean. Its area is estimated at 82,000 square miles, and its population at 500,000. The chief features of the country are the stretches of barren sand and rock, the mountains near the coast, which rise in places to 10,000 feet, and the fertile valleys and plains, which yield an abundance of sugar, coffee, rice, cotton and fruits. Dates constitute the chief product and the largest export. The country is the richest part of the peninsula, both in agricultural products and in mineral resources. The inhabitants are mostly Arabs, but there is a considerable admixture of Hindus, Persians and negroes. See **MUSCAT**.

OMAR KHAYYAM, *l i yahm'*, a Persian poet, astronomer and philosopher, born at Nishapur, in the latter half of the eleventh century. He wrote various scientific works which were of high value in their day, but he is now remembered chiefly for his *Rubaiyat*, a collection of epigrams in verse, in praise of wine, love and pleasure. The book, as freely translated into English verse by Edward Fitzgerald, is exquisite poetry but not in line with the best modern ethics.

O'MENS, signs supposed to portend future events. Belief in omens was a part of ancient religion, and rules were made according to which priests interpreted them. Among the ancient Romans the taking of omens was a public institution of great importance. To-day belief in omens is not uncommon among the more thoughtless people. See **AUGURS**.

OMNIBUS BILL, the name given frequently to single legislative acts which include many slightly related or wholly unrelated measures. In American history it is applied to the compromise measures of 1850, which, though embodied in several bills, were passed in accordance with a single plan. See **COMPROMISE OF 1850**.

OMSK, *ohmsk*, **SIBERIA**, the capital of the government of Akmolinsk, once the headquarters of the anti-Bolshevik government of Western Siberia, but now a local seat of Soviet authority. Omsk is situated on the Trans-Siberian Railway, 1,624 miles east of Moscow and 230 miles southeast of Tobolsk. It lies on a barren plain just above the point where the Om and the Irtysh rivers unite. Under the empire the city was one of the strongest military stations in Western Si-

beria, and in its military schools thousands of Cossacks received their training. The place is a distributing center for a large district. Population, 1930, 180,000.

ONEGA, *o nyé'ga*, a river in the northern part of Russia. It rises in Lake Latcha, flows in a northerly course for about 250 miles and enters the Gulf of Onega. It is navigable for steamers for about eighty miles.

ONEGA LAKE, a lake in Russia, near the center of the government of Olonetz, after Lake Ladoga the largest lake in Europe, covering an area of about 3,670 square miles. It is fed by numerous creeks, and is dotted with islands. Fish are plentiful. The lake discharges through the Svir River into Lake Ladoga.

ONEIDA, *o ní'dah*, an Iroquoian tribe who lived originally in New York along the shores of Oneida Lake. They belonged to the confederacy known as the Five (later Six) Nations (see **FIVE NATIONS**). During the Revolution they sided with the Americans, but the other Iroquoians aided the British, and under the leadership of Joseph Brant attacked the Oneidas. After the war a part of the tribe emigrated to the Thames River district, Ontario, where their descendants number about 800. There are about 3,000 Oneidas in Canada and the United States. Most of those in the latter country are in Wisconsin.

ONEIDA COMMUNITY, an organization founded by John Humphrey Noyes in the middle of the last century. At first the society was a communistic settlement. The members lived as one large family, sharing equally the labors and benefits of the Community, and the support and education of children were made the concern of the whole organization. The ideas of marriage were radical. The communists opposed a legal bond and permanent mating, and believed in what they called "Complex marriage." Their unusual views made them objectionable to the surrounding communities, and they migrated from Putney Vt., to Oneida, N. Y. Then one of the members invented a steel game trap, and the proceeds from this invention brought prosperity to the organization. In 1879 the system of complex marriages was abandoned, and two years later the community was reorganized and a joint stock company was formed, for the manufacture of silver products of high grade. The company has factories at Niagara Falls, Ont., and at Kenwood, Sherrill and Niagara Falls, N. Y.

ONEIDA, *o ni'dah*, **LAKE**, a lake in Central New York which forms the boundary between Onondaga and Oswego counties. Its length is about twenty-five miles, its width, four miles. It is drained by the Oneida and Oswego rivers. It constitutes a natural section of the New York State Barge Canal.

O'NEILL, EUGENE GLADSTONE (1888-), one of the leading American dramatists, born in the city of New York and educated at Harvard and Princeton universities. After leaving college for a number of years he had a varied career, he entered the business field, was an actor on the vaudeville stage, and was reporter on New York newspapers. When about twenty-six years of age he took up dramatic writing as his vocation. Unlike many dramatists who picture largely the outward manifestations of life, he portrays the effects of mental characteristics and shows where they tend to lead. His most important plays are *Emperor Jones*, *Desire Under the Elms*, *Strange Interlude*, *Mourning Becomes Electra*, *Alh*, *Wilderness* and *Days Without End*.

ONION, *un'yun*, a well-known plant, the bulbous root of which is much used as an article of food. It is a biennial herb, with long, narrow leaves and a swelling, pithy stalk. The peculiar flavor varies much according to the size of the bulb, the small reddish onions having much more pungency than the large ones. The onion may be grown from the tropics to the coldest regions of the temperate zone. There are at least twenty varieties, Strassburg, Bermuda, Spanish and Portuguese onions being among the most esteemed. In Spain, the onion forms a large portion of the food of the poorer classes. Egypt is believed to be the original home of the plant. In the United States and Canada it is raised in immense quantities, the leading states being Ohio, New York, Texas, Massachusetts, Illinois and Indiana. See color plate on *Lily Family*.

ONONDAGA, *on on daw'ga*, a North American Indian tribe of Iroquoian stock who belonged to the confederacy known as the Five Nations (see FIVE NATIONS). The Onondagas, who lived in Central New York near the lake that now bears their name, were the official guardians of the council fire of the league. They were not a warlike tribe, and were less prominent than the Mohawks or Senecas. At present there are about 300 on the Onondaga reservation in New York,

others are on the Grand River reservation in Ontario.



Great Lakes and on the north by James Bay and Hudson Bay.

Size and Population. Of the provinces of the Dominion, Ontario stands next to Quebec in point of size. It extends about 1,000 miles from east to west and slightly more than that from north to south. Its total area of 412,582 square miles is almost equal to the combined areas of the six New England states, together with New York, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, and Michigan. It has a fresh water area of 49,300 square miles. The relatively narrow neck of land lying between Georgian Bay and Quebec divides the Province into two distinct divisions—Old or Southern Ontario, and New or Northern Ontario. The northern portion was greatly enlarged in 1912 when the Keewatin district was divided between Ontario and Manitoba.

In 1931, according to the Dominion census, the province had a population of 3,431,683, slightly over half of it urban. The greater number of the people are of English, Scotch and Irish extraction, but in the larger cities there are many immigrants from various countries of continental Europe. There are about 30,000 Indians. The southern part, or old Ontario, contains the great proportion of the population. About one-fifth are Roman Catholics, the most important Protestant bodies are, in order, the United Church, Anglican, Presbyterian and Baptist.

Surface and Drainage. In general, Ontario is a low plateau with a rolling or wavy surface. This regularity is broken by a height of land, which extends northwesterly from the Thousand Islands in the Saint Lawrence to the north shores of lakes Huron and Superior, where it forms the bluffs that characterize this region. The highest point of this elevated section is Tip-Top Hill (2,120 feet) in the Thunder Bay district. Isle Saint Ig-

nace (1,864 feet) is the second highest point. Another height of land, caused by the elevation of the rock over which the cataract of Niagara plunges, extends to the head of Georgian Bay, where it reaches its highest point in the Blue Mountains. It thence extends northwesterly, forming the peninsula between Georgian Bay and Lake Huron and the Manitoulin Islands. The southern part of the province bordering upon Lake Ontario, is lowland. The northern part is a portion of the Laurentian plateau.

Although Southern Ontario is honey-combed with lakes and streams, the only large rivers are those which form the eastern boundaries of the province, the St. Lawrence and the Ottawa. Among the smaller rivers which drain the interior are the Petewawa, Madawasca, Rideau, Grand, Thames, Saugeen, Severn, and French. The principal rivers of the larger northern division of Ontario are the Albany and the Moose, flowing into James Bay.

Climate. The southern part of the province bordering upon the Great Lakes has a mild and equable climate. In the severest winter weather the thermometer seldom falls lower than 8° below zero, and in the hottest months it seldom reaches 90° above. The influence of the lakes here prevents sudden or great changes, but in the northern part the extremes are greater. Here the winters are severe, and the summers are short and hot. The annual rainfall varies from thirty to forty inches.

Minerals and Mining. There are large deposits of lignite coal near James Bay. The deposits are very thick. In the region north of lakes Huron and Superior are rich deposits of a variety of metals. The Sudbury nickel mines, north of Georgian Bay, are the most valuable of their kind in the world, and the Cobalt region, 300 miles north of Toronto, is one of the richest silver districts anywhere exploited. The silver ores contain such quantities of cobalt that they have become the world's most important source of that metal. Ontario's greatest mineral wealth lies in her gold. The most profitable deposits are found around Porcupine, 479 miles north of Toronto, but gold-bearing rock appears to be widely scattered over the northern part of the province. New mines are opening in the Kirkland Lake, Red Lake, Central Patricia and Thunder Bay districts. Copper occurs along the north

shore of Lake Huron, and in the region west of Lake Superior iron ore is found in paying quantities. Salt, which is found extensively in the region bordering on Lake Huron, is obtained by sinking deep wells, pumping out the brine and evaporating it. Natural gas and petroleum are other minerals of value. The total value of mineral products worked has been steadily increasing for years. The average value in recent years was over \$120,000,000.

Agriculture. Agriculture is the chief industry, and it occupies the attention of by far the greater portion of the inhabitants. The southern part of the province, bordering upon the Great Lakes, has a very fertile soil, and the climate is adapted to the growth of all products of a temperate climate. In the region farther north the soil is admirably suited to the raising of hay, potatoes and the harder grains. Forage crops, grains, vegetables and fruits are raised extensively. Hay is the most valuable field crop, followed by oats. The annual oats yield is about 75,000,000 bushels, and the acreage devoted to this grain is over 2,700,000. Ontario produces more winter wheat than all the rest of the provinces together, the average annual crop being over 14,000,000 bushels. Spring wheat is grown in every county, but not in sufficient quantities for export. Other field crops include barley, grown for feeding, Indian corn, used principally to fatten hogs, rye and flax. Over 2,600,000 bushels of peas are harvested yearly, Ontario peas being among the best in the world. Potatoes and other garden vegetables, sugar beets, tobacco and buckwheat are also cultivated.

The region along the Great Lakes is a famous fruit section. The province produces one-third of the total apple crop of Canada, and exports to Great Britain more of this fruit than any other province or state in North America. Ninety-five per cent of the grapes grown in the Dominion are produced in Lincoln, Wentworth and Welland counties, bordering on Lake Ontario. Pears, peaches, melons, plums, cherries and berries are other profitable fruits.

Bee keeping, dairying and rearing of live stock are important branches of agriculture. It is estimated that there are about 10,000 beekeepers in the province, at the provincial agricultural college courses in bee keeping are given. The annual production of cheese, butter, milk, cream, condensed milk and

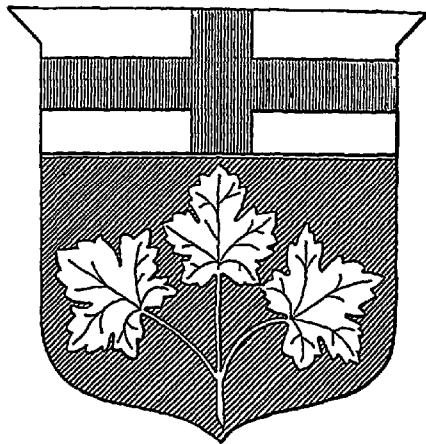
powdered milk is valued at about \$65,000,000. The dairy products are of high quality, and the province maintains two dairy schools. Ontario produces over half the cheese made in Canada, and exports large amounts to Great Britain. The province is noted for its excellent breeds of cattle, horses and sheep, and special pains are taken to keep the standards high. The same policy prevails in regard to poultry. In all lines of agriculture the government extends encouragement and aid to the producer.

Manufactures. With its splendid water-power facilities, good transportation and abundance of raw material, Ontario easily leads as a manufacturing center. Lumber products are the most important line of manufacture, and raw material is secured from the splendid stand of hard woods, spruce, pine and tamarack. About one-fourth of the province is still forest-covered, and there are about 60,000,000 acres of standing timber in the north. The iron and steel industry is also a flourishing and developing activity, the chief centers of the industry being Collingwood, Deseronto, Sault Sainte Marie, Midland and Hamilton. Flour mills, machine shops, carriage and wagon works, furniture establishments and manufactories of paper, cotton and woolen goods, pianos and organs are also numerous. At Niagara Falls there is an immense government power plant, and other valuable sites are also owned by the government, which created a hydroelectric commission in 1906 to supervise the development and distribution of power.

Fisheries. The annual value of the commercial fisheries of the province is in the neighborhood of \$3,500,000. Whitefish, trout, herring, sturgeon, pike, pickerel and other lake fish are caught in the Great Lakes waters. In connection with the fishing industry the preparation of sturgeon caviare is a flourishing enterprise.

Transportation and Commerce. The frontage of the Great Lakes furnishes ample opportunity for water transportation through the Saint Lawrence to the ocean. The southern part of the province is traversed by the Canadian National and Canadian Pacific Rys, and other lines which cross from Detroit to Buffalo. Each of these roads has cross lines and branches extending to the most important agricultural and commercial centers within its territory. One line of the Canadian Pacific and two lines of the Canadian

National traverse Northern Ontario. These are links in the great trans-Canada lines. In all there are over 10,000 miles of steam rail-



SHIELD OF ONTARIO

The sprig of golden maple leaves, on a green background, has no special significance, except as the maple leaf is the national emblem. The red cross of St. George, on a silver ground, is the emblem of British sovereignty.

way, and a constantly increasing electric mileage.

The commerce is extensive. Lumber and lumber products, agricultural produce, butter and cheese, nickel, copper, silver and gold are exported. The principal imports are manufactured products. The United States and Great Britain have the largest share of the foreign trade.

Government. The executive department of Ontario consists of a lieutenant-governor, appointed by the Governor-General of the Dominion for five years, and an executive council of eleven members, each of whom is at the head of a department. The legislature is an assembly of one house of 112 members, chosen by popular vote. The courts consist of the Supreme Court with Appellate Divisions one and two, High Court Division and the Exchequer Court of Canada, Admiralty Division. The province is divided into counties, townships, towns and cities for purposes of local government, and in each of these units the administrative body is an elective council. In Northern Ontario in sections with few inhabitants the local unit is the district, in which there is no governing council.

Items of Interest on Ontario

The first white man known to have set foot on what is now Ontario was Champlain, in 1613 he explored the Ottawa River as far as Allumette Island, and in 1615 he reached Georgian Bay by way of the Ottawa.

In 1921 the province voted itself "dry" as to alcoholic liquors, but in 1927 Government control of liquor was instituted after a decisive vote in its favor

The Ontario Agricultural and Experimental Union, started in 1886, now embraces over 5,000 farmers in the province who conduct experiments on their farms. The Union holds annual meetings for discussion of the experiments

Alfalfa is grown in nearly every county, and in some sections much attention is given to the production of alfalfa seed. In 1917-1918 the Trades and Labor Branch of National Service Workers organized camps for instructing girls in fruit picking, canning and truck gardening. Contracts were made with farmers and fruit associations for marketing the products

Ontario has about three dozen jam and jelly factories, more than 115 fruit and vegetable canning factories, and about 100 fruit evaporators

Ontario possesses approximately 600,000 horses, 1,100,000 milch cows and 1,400,000 other cattle, 1,000,000 sheep, of which about 20,000 are pure bred, and 16,000,000 poultry

The province produces about one-eighth of the annual maple sugar output of Canada. Its average yield is 515,000 pounds

In Ontario there are three Dominion National Parks, they comprise 13 islands in the St. Lawrence River, Point Pelee Bird Sanctuary, and Georgian Bay Islands Park.

The provincial government has an Experimental Forest Station of 1,800 acres in Norfolk County, where forest planting and nursery work are demonstrated. Since 1905 about 2,000,000 forest seedlings have been distributed from the government nurseries

Amber mica, used especially as an insulator in electrical apparatus, is found extensively in Eastern Ontario, and the Lacey mine, near Sydenham, is the largest of its kind in North America. Canada is the only country in the world outside of Ceylon in which there are deposits of amber mica

Questions on Ontario

What is the population? The area?

In what part of the province do most of the inhabitants live?

Describe briefly the surface of this district

What is the average density of population?

What is the highest point in the Lake Superior region?

What is the Niagara escarpment?

What is the character of the north shore of Lake Superior?

What are the three principal rivers?

For what minerals is the province noted?

Where is most of the silver mined?

What part of the world's supply of nickel does Ontario produce?

What can you say of the gold output?

For what is the Porcupine district famous?

What is the total annual value of Ontario's mineral product?

What are the principal crops?

What fruits are raised extensively?

What can you say of the importance of Ontario's dairying? Fisheries?

What is the extent of the forest area?

What proportion of the grape yield of Canada is produced in Ontario?

How does the total value of manufactures compare with that of other provinces?

What manufacturing industries depend upon natural resources?

How many miles of railway are in the province?

Why may Ontario be justly called the "premier province" of Canada?

Name five large cities of the province

Education Ontario maintains an excellent system of schools, which are under the immediate control of a minister of education. The system is rather highly centralized, and is marked by a fairly high degree of uniformity with respect to text-books, courses of study, methods of instruction, and general administrative practices. In addition to the regular public elementary and high schools there are a number of commercial, technical and industrial schools. At Toronto are located four technical schools with a total enrollment of about 20,000 students in day and evening classes, and four high schools of commerce with about 10,000 students. The province maintains four normal schools for the training of elementary school teachers and a college of education for the training of secondary school teachers. Toronto University with its federated and affiliated colleges is the provincial university of Ontario. Among the institutions which constitute the university are University College, Victoria College, Trinity College, St. Michael's College, Knox College, Wycliffe College, Emmanuel College, Ontario Agricultural College, Ontario Veterinary College, Ontario College of Pharmacy, Ontario College of Art. Other institutions of higher learning are Queens University in Kingston, Western University in London, McMaster University in Hamilton, University of Ottawa in Ottawa, and Royal Military College in Kingston.

History Canada was organized as a British possession in 1763, and in that year Ontario became a part of the old Quebec province. In 1791 this was divided into Upper Canada (or Canada West) and Lower Canada. The former division comprised Ontario, and the latter, Quebec. In 1837 a rebellion of French malcontents broke out, which was led by William Lyon Mackenzie in Upper Canada and by Louis Papineau in Lower Canada. This rebellion was suppressed, and in 1841 the two sections were united. The union continued until 1867, when the Dominion of Canada was organized. Since that time Ontario has enjoyed prosperity and progress. The province was loyal and generous in its efforts to aid Great Britain in the World War, and gave freely of its man power and its treasure. In 1916 the provincial legislature adopted a war-time prohibition measure, and in 1917 gave women municipal and provincial suffrage in line with most of the other provinces.

Related Articles. Consult the following titles for additional information.

Barrie	Kenora	Port Hope
Belleville	Kingston	Preston
Brantford	Kitchener	Revelstoke
Brockville	Lindsay	St. Catharines
Chatham	London	St. Thomas
Cobalt	Niagara Falls	Sarnia
Cobourg	North Bay	Sault Ste. Marie
Collingwood	Orillia	Smith's Falls
Cornwall	Oshawa	Stratford
Dundas	Ottawa	Toronto
Fort William	Owen Sound	Trenton
Galt	Perry Sound	Walkerville
Goderich	Pembroke	Waterloo
Guelph	Peterborough	Welland
Hamilton	Porcupine	Windsor
Ingersoll	Port Arthur	Woodstock

LAKES

Great Lakes	The Lake of the Woods	Nipigon
Muskoka Lakes		Nipissing
		Rainy

RIVERS

Ottawa	Saint Mary's
Saint Lawrence	

HISTORY

Canada, subhead	Quebec, subhead
History	History
Mackenzie, William L.	

ONTARIO, LAKE, the smallest of the Great Lakes of North America (Lake Saint Clair not being considered) and the most easterly. It is situated between Northwestern New York and the province of Ontario, its greatest length, 185 miles, lying in a general east and west direction. It is oval in shape and about sixty miles wide, is 326 feet below Lake Erie, and between the two is Niagara Falls. It receives the waters of the latter through the Niagara River and the Welland Canal. Its waters pass out at the eastern end through the Lake of a Thousand Islands, thence to the Saint Lawrence River and into the Atlantic Ocean. The coasts are broken by numerous bays and small inlets and dotted with harbors. Toronto, Hamilton, Kingston and Oswego are the principal ports. The most important rivers discharging into the lake are Genesee, Oswego, Black, Humber and Trent. The lake is navigable throughout the year and carries a heavy commerce. By canal it is connected with the Hudson and Ottawa rivers. See **GREAT LAKES**.

ONYX, *on'iks*, a variety of agate with colors which are usually shades of brown, green or red, alternating with white, arranged in parallel bands. When the red is of a deep brownish hue, and the white pure and transparent, the variety is known as *sardonyx*. Onyx was formerly highly prized for making cameos, the figures being formed of one layer and the background of another, and it is still used to some extent for this purpose. *Mexican onyx* is not a true onyx, but is a translucent limestone, with iron and manganese irregularly scattered through it, producing the beau-

ONTARIO



1 Bridge at Niagara Falls
2 Canadian Lock at Sault Ste. Marie

3 Dairy Products
4 Fruits
5 Grain Elevator at Fort William

6 University College Toronto
7 Smelter in the Cobalt District

tiful variegated appearance for which this stone is noted. It is found in layers in caves, where it was deposited by water. This stone was used by the Aztecs, who carved it into idols, masks and a variety of other objects. It is very soft and easily worked. See AGATE, CHALCEDONY, PRECIOUS STONES.

OP'AL, a precious stone, frequently showing a brilliant play of colors—yellow, red, green, blue. It is composed of silica and water, and is easily broken. The general appearance of the *precious opal* is whitish or milky, and the tints displayed are red, yellow, green, and blue or violet. The most brilliant variety known is the *fire opal*. Opals are found in Australia and in the western part of the United States. The best are mined at Dunkirk, Hungary. The finest opal known is an Austrian crown jewel weighing seventeen ounces. This gem is the birthstone for October. See BIRTHSTONES.

OPEN-AIR SCHOOLS, schools designed especially for tubercular children or others who are physically below normal and need building up. These schools are held on roofs of buildings or other out-of-door places, or in rooms open to the air, without artificial heat. The children are dressed in clothing specially designed for them, that they may enjoy the benefit of pure air and still not suffer from exposure. Nourishing food is provided, and the health is cared for in every way possible. The first American schools of this character were opened in 1904 in New York City and in Providence, R. I. So excellent were the results of the innovation that the fresh-air school is now found in nearly all large cities and in many of moderate size.

OPEN SHOP, an industrial establishment where employes may work whether they belong to labor unions or not. It is the opposite of the closed shop (where only union labor is employed). This classification represents a phase of the conflict between capital and labor that is rapidly passing. Capital more and more has been forced to accept unionism among its employes, and the conflict now is between a regular national union and a so-called company union—organized within its own shop, without affiliations.

OPERA, a dramatic composition set to music and sung on the stage, accompanied with musical instruments and enriched by the accessories of costumes, scenery and dancing. The component parts of an opera are recitatives, solos, duets, trios, quartettes and

choruses, and they are usually preceded by an instrumental overture. The chief classes of opera are *opéra seria*, or *grand opera*, constructed upon serious themes and generally a tragic outcome, such as Verdi's *Aida*, *opéra comique*, which may be serious or humorous, but contains spoken dialogue as well as musical numbers, such as Beethoven's *Fidelio*, *romantic opera*, an Italian form, representing a combination of the serious and comic, and *light*, or *comic opera*, best represented by the Gilbert and Sullivan series. Among these may be mentioned *The Mikado*, *Pinafore* and *The Pirates of Penzance*.

Development of the Opera. Though the Greek dramas were operatic in character, as the chorus was an important feature in them, the opera proper is of modern date and of Italian origin. The first operas date from the sixteenth century. About the close of this century the poet Rinuccini wrote a drama on the classical story of Daphne, which was set to music by Peri, the most celebrated musician of the age. The orchestra of this first opera consisted of four instruments, namely, a harpsichord, a harp, a viol di gamba and a lute. There was no attempt at melodies, and the recitative was merely a kind of measured speech. Monteverde, a Milanese musician, improved the recitative by giving it more flow and expression. In the middle of the seventeenth century, melodies, or airs, connected in sentiment and spirit with the dialogue were first introduced. The first regular serious opera was performed at Naples in 1615. The first light opera is said to have been presented at Venice in 1624, where also the first stage for operas was erected in 1637. In 1646 the opera was transplanted to France by Cardinal Mazarin, about the same time it was introduced into Germany, and somewhat later it was taken to England. Lavish expenditures attended the presentation of these early operas. In 1680 an opera was performed in Padua which required a chorus of 100 girls, 100 soldiers and an equal number of iron-clad horsemen.

At the beginning of the eighteenth century a revival and reform occurred, the German-Frenchman Gluck being its chief exponent, his purpose being to restore to opera the dramatic element which it had long lacked. Then began a separate national development in each of the great countries of Europe. The chief Italian composers include, besides those

mentioned, Piccini, Cherubini, Rossini, Bellini, Donizetti, Mascagni, Puccini, and Verdi. Among the French composers are Meyerbeer, Grétry, Auber, Halévy, Gounod, Offenbach, Bizet, Saint Saens, Massenet, Debussy and Charpentier

Among American composers of operas may be mentioned Reginald de Koven, Victor Herbert, Damrosch and Sousa, and among English composers, Balfe, Macfarren, Sullivan, Mackenzie and Thomas. It is the German composers, however, who have raised opera to the highest point of perfection, the list including such names as Handel, Mozart, Beethoven, Weber, Flotow and, finally, Richard Wagner, the most celebrated of modern composers. In his work, the vocal music of the piece is deprived of the prominent place formerly assigned to it and is made subordinate to text, instrumentation and scenic decoration. He preferred the name *musical drama* for his works.

The following are among the best-known operas:

Aida, Verdi	Martha, Flotow
Barber of Seville, Rossini	Meistersinger von Nürnberg, Wagner
Bohemian Girl, Balfe	Mikado, Sullivan
Carmen, Bizet	Nora, Bellini
Cavalleria Rusticana, Mascagni	Oberon, Weber
Don Giovanni, Mozart	Pagliacci, Leoncavallo
Faust, Gounod	Rienzi, Wagner
Fliegende Holländer, Wagner	Ring des Nibelungen, Wagner
Der, Wagner	Robin Hood, De Koven
Fra Diavolo, Auber	Robert le Diable, Meyerbeer
Freischütz, Der, Weber	Salome, Strauss
Les Huguenots, Meyerbeer	Tannhäuser, Wagner
Lohengrin, Wagner	Tristan und Isolde, Wagner
Lucia di Lammermoor, Donizetti	Trojens, Les, Berlioz
Madame Butterfly, Puccini	Trovatore, Il, Verdi
Magic Flute, Mozart	William Tell, Rossini

Related Articles. Consult the following titles for additional information

Aida	Faust, John
Carmen	Lohengrin
Cavalleria	Parsifal
Rusticana	Tannhäuser
Comic Opera	

COMPOSERS AND SINGERS
See Music

OPERA GLASS, a small, double telescope, used chiefly in the theater to obtain a clearer and more distinct view of the actors; it is also much used in outdoor nature study. The instrument has a double-convex lens for its object glass and a concave lens for the eyepiece. The eyepiece is attached to a rack and pinion, by means of which it can be

properly focused. See **FIELD GLASS**; **LENS**, **TELESCOPE**

OPHIR, *o'feer*, the region to which the Hebrews made voyages in the time of Solomon, bringing home gold, precious stones and fine wood (*I Kings* IX, 26-28, X, 11, *II Chron* VIII, 18). Some authorities believe that it was situated in the Arabia, others think it was in India or Africa.

OPHTHALMIA, *of thal'me a*. See **CONJUNCTIVITIS**

OPHTHALMOSCOPE, an instrument for observing the internal structure of the eye. It consists of a mirror, by which light from an artificial source is directed into the eye of the patient, and a double convex lens, by which the illumined parts of the structure of the eye are magnified, in order that they may be more easily examined, the observer looking through a hole in the center of the mirror. The light is usually placed to the side of and slightly behind the patient's head.

OPIMUM, the dried juice of a species of poppy, used in medicine, by the dissolute as an opiate, and well known in many places as an ornamental garden plant. Commercially it is of more importance than any other drug. It is a powerful narcotic, and is used in med-



OPIMUM POPPY

a, whole plant, b, flower and leaf, c, ripe capsule, d, seed and its section, enlarged.

icine chiefly to procure sleep and to bring relief from pain. It is often used in the form of *laudanum*, and is an ingredient of many patent medicines (see **MORPHINE**).

The juice, which is procured by making an incision in the green head or seed capsule of the flower, flows out in the form of a milky liquid, soon it hardens and turns black. It is then scraped off and dried thoroughly, and next goes through a kneading process and is molded into cakes or balls for the market.

The agreeable effects produced on the system by opium have tempted many persons to form the opium habit. Evil effects as serious as those of excessive alcoholic drinking follow over-indulgence in opium. The habitual use of opium is most common in China and the Malay Archipelago, though it has decreased considerably in recent years owing to the influence of missionaries and to an agreement between China and Great Britain, whereby the latter country has promised to curb the production and exportation of opium from India, the chief source of China's supply. The western market is supplied with opium from Asia Minor.

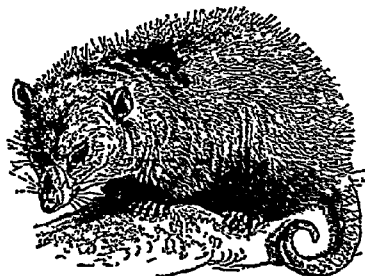
Opium War, a war between China and Great Britain which began in 1840 as a result of China's attempts to stop the importation of opium from India. In 1729 an edict had been passed forbidding the importation of opium into China from India. Notwithstanding all precautions, it continued to be smuggled in, and in 1839 the Chinese government took stringent measures. A shipload of opium bound for China and valued at ten million dollars was destroyed in Canton harbor. Serious complications followed. It was shown that the sudden stoppage of opium traffic would result in widespread famine in India, where in many places it had been the chief crop. In the end China was forced to pay a large indemnity, but Great Britain agreed to stop the Indian production gradually. In 1906 the use of opium was prohibited in the schools and in the army, and people were forbidden to grow it. In 1916 further steps were taken by the government to banish the evil.

OPORTO, PORTUGAL, the second city in size in the kingdom (ranking next to Lisbon), and capital of the district of its own name, is situated on a steep declivity on the right bank of the River Douro, three miles from its mouth and about 175 miles north-northeast of Lisbon. The river is crossed by two bridges of recent construction, one of which is the largest and most beautiful bridge of its kind in Europe. Among the chief buildings of the city are the "Tower of

the Clergy," a granite structure 246 feet high, the Gothic cathedral, the episcopal palace, the exchange, the crystal palace, the mint and the opera house. There are also museums, a large library, a medical college, schools of commerce and navigation and other schools of high rank, together with hospitals, art galleries and fine gardens. Oporto is the chief industrial city of Portugal. The principal trade is in wine, chiefly port wine, which is named from the town. There are manufactures of hats, silks, cotton, woolen and linen stuffs, paper, wax, tobacco, soap and other articles.

Oporto was an important town during the Middle Ages. In 1808 it was captured by the French, and in the following year Wellington drove the French out of it, after the remarkable passage of the Douro. Early in 1919 it was seized by revolutionary forces seeking to restore the monarchy, and was made their stronghold. In February the royalists were suppressed and Oporto restored to republican control (see PORTUGAL). Population, 1931, 232,280.

OPOSSUM, a mammal found in America as far north as Hudson Bay. It is nocturnal in its habits and lives mostly in trees, swinging from branch to branch with the aid of its tail and feeding on small reptiles, birds' eggs



OPOSSUM

and young and almost anything else which comes its way. There are about twenty species, some are as small as a rat, and others are the size of a large cat. The largest, the common opossum, is the only animal in America which has a pouch for carrying the young. It is whitish-gray in color, and the hair is soft and wool-like. It is common in the southern part of the United States, where it is regarded by negroes as a choice meat for the table. When captured or threatened with danger, the opossum feigns death, and

the phrase "playing 'possum" is on this account often used to indicate any deceitful proceeding. It is a marsupial (which see).

OPPEE, **FREDERICK BURR** (1857-), an American illustrator, born in Madison, Ohio. For several years he was connected with Frank Leslie's magazines, *Puck* and *Hearst's New York Journal*. He made a reputation with his cartoons against political leaders and the "trusts" in political campaigns. His drawings, while lacking artistic merit, forcefully express a situation or an idea and often reveal a keen sense of humor. He illustrated the writings of "Bill" Nye and Mark Twain, and Peter Dunne's *Mr. Dooley*. He also ranks as an author of some note, having written *Folks in Funnyville*, *John Bull*, *Happy Hooligan*, *Alphonse and Gaston* and *Our Antediluvian Ancestors*.

OPTIC NERVE. See **EYE**

OPTICS. See **LIGHT**

OPTIMISM, *op'ti-mis'm* (from the Latin word *optimus*, meaning *best*), is the belief that there is more good than evil in the world and that mankind is growing better, a disposition to take a hopeful attitude toward life and to look on the bright side of things. One who habitually takes this view is called an *optimist*, one who holds a contrary view is called a *pessimist*. The word *optimism* was first employed by the German philosopher Leibnitz, whose optimism was based on logic. Most of the optimism in the world is due not to logical reasons but to a joyous and happy temperament.

ORACLES, *or'a-k'lz*. Nearly all of the peoples of antiquity believed that the gods controlled their destinies, and, moreover, that if the deities were consulted they would give advice concerning the proper course to be pursued for the attainment of success. The places of consultation, often the temple of the god approached, and also the replies to inquiries, were alike called oracles. The belief in oracles was so firm that vast numbers flocked to them for advice, and scarcely any war was waged, or peace concluded, or new form of government instituted, or new laws enacted, without the approbation of some oracle. The Greek oracles were the most celebrated, and among these the earliest, and one of the most famous, was that of Jupiter at Dodona. Apollo had many oracles, but that at Delphi held the first place, and it was often applied to for explanation of obscure answers obtained at Dodona. Another famous oracle of

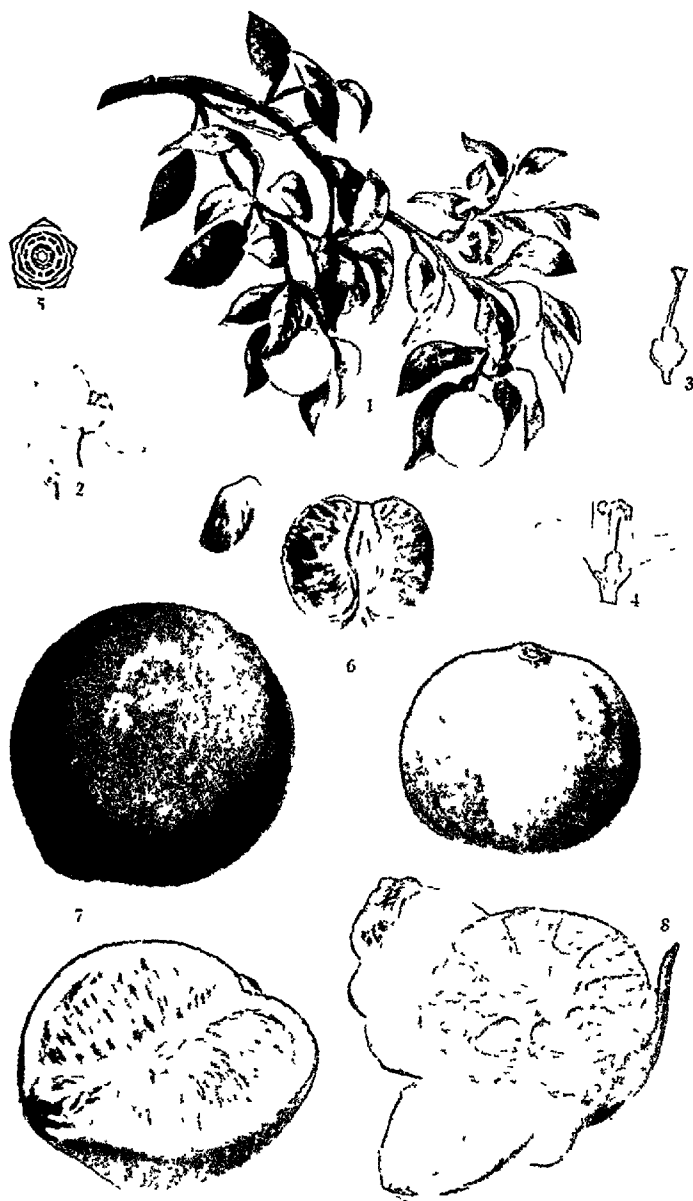
Apollo was in the island of Delos. The Romans had no important oracles of their own, but often consulted those of Greece and Egypt. Under the reign of Theodosius, the temples of the prophetic deities were closed or demolished. See **DELPHI**.

ORAN, *o'rahn*, **ALGERIA**, a seaport and the capital of the department of Oran. It is 200 miles southwest of Algiers, on the Bay of Oran, an inlet of the Mediterranean Sea. The town is fortified, has a good harbor and considerable European architecture. It was founded by Arabs in the tenth century and became in time an important center. When the Moors were driven from Spain they took possession of Oran, and it became a port for pirates. In the sixteenth century Spain, to stop marauding, captured the port, but lost it to Turks a hundred years later. It regained possession in 1709, but abandoned the town after an earthquake had practically destroyed it in 1791. The French have occupied it since 1831. The city has a considerable trade, the principal exports being cereals, wine, olives, brandy, flour, esparto grass, sheep and cattle. The imports are coal and manufactured goods. Population, 1931, 163,745.

ORANGE, *or'anj*, the most important of the citrus fruits, the group which includes the lemon, citron, lime and grapefruit. It is the fruit of a long-lived evergreen tree. The orange was brought from Southern Asia to Spain and Portugal during the sixteenth century. Taken to South America by the early explorers, it ran wild in the tropical forests of the Amazon, about the same time the sour orange was brought into Florida by the Spaniards. Here, until 1880, large wild groves were to be found, usually on mounds marking the former homes of the natives. In more recent years the stock of this class of oranges has been utilized to graft the sweet orange and the tangerine (see accompanying colored plate), which have since been extensively cultivated.

Description. The orange tree is small and has broad, green leaves. Under the most favorable circumstances it seldom exceeds thirty feet in height, and in cultivation it is kept much lower. The branches are low, and the flowers are white and waxlike, because of their beauty and fragrance orange blossoms have long been worn in almost all parts of the world by the bride on her wedding day.

The fruit is nearly spherical, bright yellow in color, and contains a pulp which con-



ORANGES

1 Branch with Fruit and Flower
2 Flower and Bud
3 Pistil and Ovary

4 Section through the Flower
5 Plan of the Flower
6 Blood Orange

7, Navel Orange.
8, Tangerine.



THOUSANDS OF ORANGE GROVES ARE IN SETTINGS LIKE THIS

In this California grove, there is beauty and fragrance in the semi-tropical scene which is enhanced by a snow-capped arctic background. Nevertheless, these expert pickers find their work hard under a summer sun.



GRADING ORANGES FOR PACKING

On an endless belt the golden globes reach the expert sorters, who must apply to every orange a certain standard of quality and grade.

The Orange

I DESCRIPTION

- (1) Tree
 - (a) Height
 - (b) Branches
 - (c) Leaves
 - (1) Shape
 - (d) Blossom
 - (1) Color
 - (2) Shape
 - (3) Fragrance
- (2) Fruit
 - (a) Shape
 - (b) Color
 - (c) Kinds
 - (1) Navels
 - (2) Blood Orange
 - (3) Russets
 - (4) Mandarins

II PRODUCTION

- (1) Mediterranean countries
- (2) India and the East Indies
- (3) North and South America
 - (a) United States
 - (b) Brazil
 - (c) Other countries

III HARVEST

- (1) Picking
- (2) Sorting
- (3) Packing
- (4) Shipping

Questions on the Orange

Of what continent is the orange a native?

What countries are the chief producers of oranges?

On what kinds of soil does the orange thrive?

Name three common varieties. Describe each as well as you can

What is the average height of an orange tree?

What are the chief orange-producing states of the United States?

How are oranges prepared for shipment?

What conditions cause a variation in the average crop in the United States?

Why are orange blossoms popular with brides?

What can you say about the longevity of the orange tree?

sists of a collection of oblong segments, filled with a sugary and refreshing juice and in most varieties containing several seeds. There are many varieties under cultivation, but those in greatest demand in the United States are the *navels*, which are seedless. This orange was introduced from Brazil and is now grown in large quantities in California. *Blood oranges* are so called from the color of their juice, which is dark red. The oranges grown in Florida are generally known as *russets*. They are of a lighter yellow than the others, and the peel has a bronze coat which gives the orange its name. The *mandarin* orange, introduced from China, is small and somewhat flattened.

Cultivation The orange is a warm-climate plant. It flourishes in any moderately fertile soil, if it is well drained and sufficiently moist, but a rather stiff loam, mixed with some vegetable matter, is best suited for the purpose. Grafting or budding on stocks raised from the seed is the usual method of cultivation. Carefully selected seeds are sown in well-prepared ground, and the seedlings removed to a nursery bed in the fourth or fifth year. About the seventh or eighth year they are grafted with the desired variety. After the grafts are sufficiently strong, the trees are planted in rows in a permanent orangery. The distance left between the trees varies. In France, when the trunks have reached a height of five to six feet, an average space of twenty feet is left, in the West Indies and the Azores a space of twenty-four or even thirty feet is not uncommon. The ground is kept well broken between the trees and the roots manured. In dry climates water must be supplied in abundance, nearly all the California orchards are irrigated. The trees require careful pruning, the heads being trained to a spherical form.

Marketing In good seasons the orange tree produces great quantities of fruit, a single tree will produce from 400 to 1,000 oranges. A healthy tree will bear abundantly for fifty to eighty years, some of the bitter variety produce a fair crop for several centuries. Blossoms and green and ripe fruit are sometimes seen on the trees at the same time, but the bulk of the crop ripens at about the same time. When picked, the oranges are carefully wrapped in tissue paper and packed in boxes holding from 100 to 250 oranges, according to the size of the fruit. Average fruit runs from 176 to 200 in a box.

Production in America. In the United States California and Florida are the chief orange states. In favorable years the total annual output of the country is about 48,000,000 boxes, but this yield is sometimes reduced fifty per cent by frosts or other unfavorable weather conditions. The average California crop is 32,500,000 boxes, and that of Florida, 15,200,000. Louisiana, with 200,000, and Arizona, with 150,000, are next in order.

ORANGE, N J, the parent settlement, in 1666, which has become, by growth and division, four cities, all of them attractive suburban towns, tributary to New York City. They are Orange, East Orange, West Orange and South Orange.

Orange, on the Erie and Lackawanna railroads, was originally a part of Newark, and existed first as Newark Mountain and then as the Mountain Society until 1806, when its present name was adopted. The surrounding scenery is most attractive, the elevation, twelve miles from the ocean, is about 200 feet, although hills in the vicinity reach 600 feet. The principal industry is the manufacture of adding machines and calculators. Population, 1920, 33,268, in 1930, 35,399.

East Orange, on the Erie and the Lackawanna railroads, is chiefly a residential suburb, though there are manufactories of electrical and pharmaceutical supplies. The town was a part of Orange until 1863. Here are Upsala College and schools for secretarial training. Population, 1930, 68,020.

West Orange, until 1862 a part of Orange, is on the Erie Railroad, five miles northwest of Newark and twelve miles west of New York City. Here are the great Edison electrical works, and there are also carriage and hat factories. Population, 1920, 15,573, in 1930, 24,327.

South Orange, a town south of the parent city, from which it was separated in 1861. It is four miles west of Newark, on the Lackawanna Railroad, and has a fine location facing Orange Mountain. The Roman Catholic Church has here Seton Hall College, established in 1856. Population, 1930, 13,630.

ORANGE FREE STATE, PROVINCE OF THE, one of the four states of the Union of South Africa. It is separated from the Transvaal, on the north, by the Vaal River, and from the Cape of Good Hope province, on the south, by the Orange River. Its area is estimated at 49,647 square miles, or about the same as that of New York. Lying at a

height of about 4,000 feet above the sea, the country, which is composed chiefly of vast undulating plains, is cold in winter, with violent thunder storms and long droughts in summer. The seasons are the reverse of those in countries in the northern hemisphere having a corresponding latitude. Because of the altitude, the climate is very healthful.

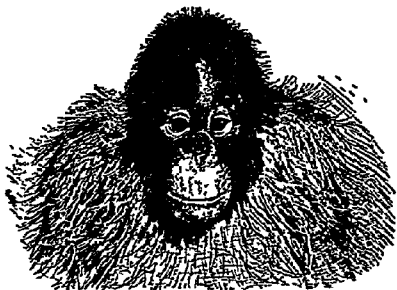
Pasturing is the chief occupation, and wool, hides and ostrich feathers are among the principal exports. Agriculture is increasing in importance, and corn is exported in considerable quantities. Diamonds and other precious stones have been found in paying quantities. Rich coal mines exist, and the country is said to abound in other mineral wealth. There are over 1,340 miles of railway in operation, the chief line being the one which connects Bloemfontein, the capital of the province, with the Transvaal railway systems.

The province is governed by the Administrator, appointed by the Governor-General for a term of five years, and by the provincial council, of twenty-five members, elected for four years. Education, while under the control of the government, is neither free nor compulsory. In 1836 a colony of Boers from Cape Colony, dissatisfied with the British rule there, entered the territory which is now the Orange Free State. The British annexed the territory in 1848, but in 1854 it was declared a free state. When war broke out between the South African Republic and Great Britain, the Orange Free State joined the former, and as a result of British successes was declared a possession of the British crown in 1900. It was then given the title Orange River Colony. On the formation of the Union of South Africa, in 1910, it became a state of the Union, with its present name. Population, 1931, 745,600 (about 210,000 whites). See **BLOEMFONTEIN, UNION OF SOUTH AFRICA**.

OR'ANGEMEN, the popular name for the members of a society of Irish Protestants. It was formally organized in Ulster in 1795, the official name being Loyal Orange Institution. Because of disorders connected with its growth and activities, it was suspended in Ireland from 1813 to 1838, and at present is of small influence in the island. There are, however, a number of branch lodges in the United States. July 12, the anniversary of the Battle of the Boyne, is observed as Orange Day.

ORANGE RIVER, the longest river in South Africa. It rises on the western slopes of the high mountains in Basutoland, less than 200 miles from the Indian Ocean, and, flowing in a general westerly direction, travels 1,300 miles across the continent and enters the Atlantic, draining a region embracing 400,000 square miles. The largest of its tributaries is the Vaal. Numerous cataracts and cascades occur in its course. At Hundred Falls the water rushes over a series of ledges and falls 400 feet in sixteen miles. A large sand bar at the mouth of the river closes it to ocean vessels, above the bar it is navigable a short distance for small vessels. In parts of its course the waters can be used for irrigation. The native Hottentots call the river the *Garib*, meaning *great water*.

ORANG'-UTAN', or **ORANG'-OUTANG'**, one of the anthropoid, or manlike, apes, or monkeys, found in Borneo and Sumatra. It



ORANG-UTAN

reaches a height of four or five feet and is second in size only to the gorilla. It is one of those animals which approach most nearly to man, being in this respect only inferior to the chimpanzee and gorilla. It is utterly incapable of walking in a perfectly erect posture. Its body, except the face, is covered with coarse hair, of a brownish-red color. The arms reach to the ankle joint, the hind legs are short and stunted and the nails of the fingers and toes are flattened. The orang-utans swing themselves quickly along from tree to tree, by the aid of their long arms, but their gait on the ground is awkward and unsteady. They are remarkable for strength and intelligence, and are capable of being tamed and taught, if captured when young. They feed chiefly on fruits and sleep in trees. See **MAN**, **APE**, **MONKEY**.

ORA'TION, a formal public speech in dignified style, delivered on some special occasion. Orations may be of several classes: *demonstrative*, in which the purpose of the speaker is less to persuade than to please his audience, *deliberative*, or *exhortative*, in which the speaker aims to secure a certain decision, to arouse people to action or to convince them of a truth, *judiciary*, used chiefly by advocates in court, characterized by clearness, close logic and earnestness. Some of the greatest addresses have been pleas in court.

The oration was the form of literature first to be developed to comparative perfection. It advanced through all the stages from the exhortation of armies by their commanders to the addresses in behalf of great causes in modern free deliberative assemblies. Among the Greeks were many famous orators, of whom Isocrates, Demosthenes, Aeschines and Pericles are especially famous. The names of Cicero, Mark Antony and Cato represent Roman oratory at its best. From the downfall of the Roman Empire until the late modern period, oratory suffered a decline, but at the time of the American and French Revolutions there was an awakening, signified by such names as Pitt, Mansfield, Sheridan, Burke, Fox, Patrick Henry, James Otis, Alexander Hamilton and Richard Henry Lee.

Probably in no equal period in the history of any nation have so many remarkable orators arisen as during the slavery controversy in the United States. Notable among these are Calhoun, the spokesman of the South, Webster, the representative of the North, Clay, the compromiser and defender of the Union, Sumner, the advocate of universal liberty, Douglas, the expounder of state sovereignty, Everett, one of the greatest scholars and rhetoricians of his time, Choate, unsurpassed as a forensic orator, Phillips, the agitator, James G. Blaine, the political orator and George William Curtis, the supporter of independence and honesty in politics. Among single orations Abraham Lincoln's *Gettysburg Address* holds first place in American literary annals. America has also produced many eloquent pulpit orators, such as Phillips Brooks, Henry Ward Beecher and Newell Dwight Hillis. Among recent political orators William Jennings Bryan is perhaps the most effective. Sir Wilfrid Laurier, former Premier, was unsurpassed among modern Canadian orators.

Related Articles. The following are representative of the notable orators whose biographies are found in these volumes

Aeschines	Douglas Stephen A.
Beecher, Henry Ward	Everett, Edward
Blaine, James G	Fox, Charles J
Hayne, Robert Y	Isocrates
Henry, Patrick	Laurier Wilfrid, Sir
Hillis, Newell D	Otis, James
Brooks, Phillips	Pericles
Bryan, William J	Phillips, Wendell
Calhoun John C	Pitt, William
Cicero, Marcus Tullius	Webster, Daniel
Clay Henry	Yancey, William L.
Demosthenes	

ORATORIO, a sacred musical composition performed with full orchestra, singers, and sometimes organ accompaniment. The subjects, usually taken from Scripture, are lofty in tone and are impressively treated. The oratorio originated about the year 1540. Its chief object at that time was to render religious services attractive. Its increasing popularity induced poets of eminence to supply texts for these works. Among the most notable oratorios are *The Messiah*, by Handel, *The Creation* and *The Seasons*, by Haydn, *Saint Paul and Elijah*, by Mendelssohn, and *Passion According to Saint Matthew*, by Bach.

ORCHESTRA, *or'kes tra*, in ancient times that part of the Greek theater between the spectators and the stage reserved for the chorus. In the Roman theater the seat reservation for senators was called the orchestra. In modern times the word is applied to the pit, or space reserved in theaters for the musicians, also to the musicians themselves, collectively considered, and to the musical instruments on which they play. A modern orchestra, in the last sense, consists of stringed, wind and percussion instruments, in varied proportions, according to the number of performers, this number varying from eight to more than a hundred. As many as twenty different instruments are represented.

ORCHIDS, *or'hids*, the common name of a family of curious plants, found plentifully in the tropics, but also represented by many species in the temperate regions. There are, in all, several thousand species, some growing naturally in the ground; others upon tree trunks or rocks, seeming to obtain all their nourishment from the air, and a third class growing as parasites upon trees and other plants. Orchids are favorites with gardeners and plant lovers, because of the extraordinary forms of the flowers, the brilliancy of their colors and their fragrance. There are probably 3 000 species now under cultivation. So far, Mexico, Central America

and South America have been the most productive of fine specimens.

The flowers are of extremely irregular shape and are either solitary or grouped in spikes or in long, loose clusters. Normally the flowers have three petals, one of which, called the *lip* or *labellum*, is developed in a remarkable manner. In some species this is a long, narrow strip; in others, a broad surface variously cut and fringed, and in still others, a pouch or sack, as in the common



ORCHID

lady's slipper. The purpose of all, however, seems to be to invite insects for the purpose of fertilization, for most species would soon become extinct were it not for the aid of the insects. In the lady's slipper, for instance, the insect is tempted to enter the sack, which it may do from any side, but when it tries to leave, the curled edge of the petal and the stiff, slanting hairs prevent it from going out except by the very narrow path which leads by the pollen mass and the pistil. But this is not all. Each species of orchid must be fertilized by an insect which is especially adapted in size and shape to carry the pollen. In fact, nothing in the vegetable kingdom is more wonderful than the strange and characteristic shapes into which orchids have grown, to adapt themselves to their insect friends. The lady's slipper, the begonia, the calopogon and several fringed orchids are beautiful specimens found in damp soils in the United States. In the tropics there are many species of air plants which have peculiar foliage, and brilliant and beautiful flowers.

ORDEAL. Among peoples in a primitive stage of culture there has long been a widespread belief that a supernatural power will protect the innocent and punish the guilty. When, therefore, in such societies men and women have been accused of committing wrongs, they have been subjected to certain tests which afforded opportunity for divine intervention. These tests or ordeals were of

two kinds, *fire ordeal* and *water ordeal*. The former was confined to persons of high rank, the latter, to the common people.

The person who underwent fire ordeal either took in his hand a piece of red-hot iron or walked with bare feet and blindfolded over glowing coals or over nine red-hot plowshares, laid lengthwise at unequal distances. If he escaped unhurt, he was adjudged innocent, otherwise he was condemned as guilty. One who underwent ordeal by water was either forced to plunge his bare arm to the elbow in boiling water, or was tied and thrown into a pond or river. If he sank he was adjudged innocent. Trials by ordeal were suppressed in the thirteenth century in Europe, certain forms of trial by ordeal are still found in India and among some African tribes.

ORDER, a term used in botany and zoology with respect to classification. An order is a group of families having a common resemblance, while the family is a group of genera (plural of *genus*). A distinction between order and family is not always observed, as in some systems of classification the terms have the same meaning. See **GENUS**, **FAMILY**.

ORDER OF THE BATH, an order of knighthood in England, the oldest on record in that country. Its date of establishment is unknown, but there is an account of its bestowal by Henry I on Geoffrey of Anjou in 1127. At that time anyone who received the honor was expected to bathe, in token of the purity of life demanded of knights, hence the name. The organization declined in the course of time, but after a century of obscurity it was revived by King George I in 1725. The order was a military one until 1847, since when it has been conferred on writers, scientists and artists, as well as on warriors. There are three classes of knights: Knights Grand Cross of the Bath (G C B), Knights Commanders (K C B) and Companions (C B). Recipients of the last named bear no title, the others use the prefix "Sir."

ORDER OF THE GARTER, or **ORDER OF SAINT GEORGE**, the highest order of chivalry in Great Britain, was established by King Edward III in 1349. The membership is very select and was originally restricted to the sovereign and twenty-five knights. In 1831 the order was reorganized and the membership extended to include the Prince of

Wales and such descendants of George I and foreign sovereigns as might be chosen. It now includes about sixty members. The emblem is a dark blue ribbon, edged with gold and bearing the motto *Honi soit qui mal y pense* (Shame to him who evil thinks) in gold letters. It is worn on the left leg just below the knee. The monarch of England is the Grand Master.

ORDERS, RELIGIOUS. See **MONACHISM**, **BENEDICTINES**, **DOMINICANS**, **FRANCIS OF ASSISI**.

ORDERS IN COUNCIL, a term applied to decrees issued by the British sovereign, with the advice of the Privy Council. During the Napoleonic wars England used the Order in Council as a commercial weapon against Napoleon, to offset his decree blockading the British Isles. In 1914, after the outbreak of the World War, a British Order in Council was issued proclaiming the North Sea a war zone. Subsequently the British blockade was greatly extended, and Germany retaliated with unrestricted submarine warfare.

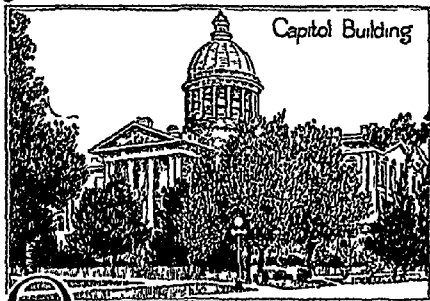
Related Articles. Consult the following titles for additional information:
 Blockade Milan Decree
 Continental System War of 1812
 Embargo World War

ORDINANCE OF 1787, a statute adopted by Congress, July 13, 1787, providing a plan of government for the territory northwest of the Ohio River, known as Northwest Territory. The government was placed temporarily in the hands of a governor, a secretary and three judges, who might apply to the territory any law then in force in any of the thirteen states. The legislature was to be organized as soon as there were 5,000 free males of "full age" in the district. The ordinance also included six other articles, which constituted its distinctive feature. They granted religious freedom, guaranteed the benefit of the writ of *habeas corpus*, trial by jury and proportionate representation in the legislature, emphasized the necessity for education, forbade slavery and declared that the territory should always remain a part of the United States. The ordinance has been called the "greatest and most important legislative act in American history." See **NORTHWEST TERRITORY**.

ORD'NANCE. See **CANNON**; **ARTILLERY**.
ORDOVICIAN, or *do vish'an*, **PERIOD**, a period of geologic time, the second oldest of the Paleozoic Era (which see). The rocks of the period include the formations just below

the Silurian. In North America the rocks are especially prominent in New York, where local names have been given a number of the formations, such as the Niagara, the Hudson, the Trenton and the Chazy. Ordovician rocks also occur westward from the Appalachians as far as Minnesota. In general, they follow the V-shaped Laurentian continent of that period. Most of the rocks are marbles and sandstones, and some of them are of considerable economic value. The petroleum in Indiana and Ohio and some of the natural gas found in these regions occur in the Ordovician formations, as do the deposits of zinc and lead ore found in Wisconsin, Illinois and Missouri.

ORE, a mineral from which metals can be extracted with profit. Most gold and platinum and some other metals occur in ores in a native state; others, such as copper, lead, zinc and iron, are chemically combined with other substances. Ores frequently occur in veins, or lodes, which are metalliferous deposits in fissures or cracks in rock. Metals are commonly separated from the ore mass by crushing the ore and smelting, either in a blast furnace or an electric furnace. Often the ore is first roasted, then smelted and subjected to chemical processes, as in the case of the extraction of gold and silver from low-grade ores.



OREGON, one of the Western states of the American Union, lying south of Washington and west of Idaho. California and Nevada touch it on the south, and on its western border is the Pacific Ocean. Rich in natural resources and possessing great tracts of fertile land, Oregon can look forward with confidence to a prosperous future. Though it is not thickly populated, its people are alert, progressive and unafraid of innovations, and it has made a record for progress in democratic ideals surpassed by no state

and equaled by few. Oregon is popularly known as **THE BEAVER STATE**, on account of the many beavers found in this region in the early days. Its floral emblem is the Oregon grape.

Area and Population. The ninth state in size, it has an area of 96,699 square miles, of which 1,092 square miles are water. The states nearest it in size are Utah and Wyoming, the latter but 1,215 square miles larger. Texas is about three times as large. In 1930, with 953,786 inhabitants, Oregon was the thirty-third state in population. It then had 10 persons to the square mile, about the same density as Colorado, and greater than that of either North or South Dakota. Among the foreign population, Germans and Canadians are found in greatest number. There are more than 8,000 Chinese and Japanese, and over 9,700 Indians. The latter live upon the Klamath, Umatilla and Warm Springs reservations.

Religion. The Roman Catholics constitute the strongest religious body, and Methodists are the most numerous of the Protestants. Others, in order of rank, are the Baptist, Presbyterian, Disciples of Christ and Congregational denominations.

Cities. In 1930 there were eight cities with populations exceeding 8,000. These were Portland (301,815), Salem (26,266), Eugene (18,901), Klamath Falls (16,093), Medford (11,007), Astoria (10,349), Bend (8,848), and La Grande (8,050).

Surface and Drainage. Oregon is crossed from north to south by three ranges of mountains; the Coast Range, from ten to thirty miles from the coast; the Cascades, nearly parallel with the Coast Range and from 120 to 150 miles inland, and the Blue Mountains, in the eastern part. The Coast Range varies from 1,000 to 4,000 feet in altitude. The range is irregular, with numerous transverse valleys, but it is broken in only a few places. The Cascades have an average height of nearly 6,000 feet, but there are a number of peaks that exceed 10,000 feet. The most prominent of these is Mount Hood, near the northern border, with an altitude of 11,225 feet. Other peaks worthy of mention are Mount Jefferson, Mount Pitt, Diamond Mountain and the Three Sisters. Both ranges are heavily timbered to the tree line, making Oregon a leading state in extent and value of forest area. Between the Coast Range and the Cascades is a broad, fertile

valley, which in the northern part is rolling prairie, watered by the Willamette. The southern part is broken and uneven. This valley is crossed by four spurs of the Cascades, which extend to the Coast Range.

The region east of the Cascades, comprising about two-thirds of the state, consists of a high plateau, with a rolling, uneven surface in the south, and in the north merging into the Blue Mountains. This plateau is separated into northern and southern slopes by a height of land which extends across the state in an irregular line from the eastern boundary, about midway between the northern and southern borders, and having a somewhat southwesterly trend. The region north of this divide is more undulating than that to the south. In the northeast it is crossed by the Blue Mountains, an irregular range having an altitude of about 7,000 feet. Several rivers have cut their way through this range, forming canyons remarkable for their scenery. That of the Snake River on the northeastern boundary is considered by some a rival of the Grand Canyon of the Colorado. The canyons of the Columbia are also noted for their scenery. In places, cliffs of basalt rise abruptly from the river to the height of several hundred feet. In other places there are beautiful cascades.

The Columbia River, which forms most of the northern boundary, and its largest tributary, the Snake, forming the greater part of the eastern boundary, drain the northern half of the state. The chief tributaries of the Columbia from west eastward are the Willamette, the Deschutes and the John Day. The southeastern part of the state is drained by the Owyhee, which rises in Nevada and flows northward into the Snake. West of the Cascades and south of the Willamette are found the Umpqua, the Rogue and the Coquille, flowing directly into the Pacific. In the southern part there are a number of lakes.

Climate. Like other Pacific states, Oregon has an east and west, rather than a north and south variation in climate. Owing to the warm winds of the Pacific, that portion of the state west of the Cascades has a mild and equable climate, in winter the average temperature is 42°, and in summer, about 63°. But east of the Cascades, greater extremes are found. Here the thermometer falls as low as 30° below zero in the severest weather and rises to 110°, or more, in the summer

months. The rainfall is more uneven than the temperature. Along the coast it varies from 89 to 114 inches, and in the Willamette valley it is about 51 inches, while east of the Cascades it varies from about 13 inches, in the northern part of the state, to 6½, in the southern, hence, the eastern two-thirds of Oregon has an arid climate, and in most of this region irrigation is necessary for the growing of crops. The reason of this unequal distribution of rain is the position of the Cascades and the prevailing westerly winds. These winds come moisture-laden from the ocean, strike the cold mountain tops, and have their vapor condensed into rain, which falls on the west side of the ranges.

Agriculture. The finest farm land is in the valley of the Willamette, between the Coast Range and the Cascade Mountains. Here there is abundant rainfall and a soil capable of producing every crop of the middle latitudes. In the Willamette Valley and in the valleys of the Hood and Rogue rivers bountiful harvests of apples and other orchard fruits are produced, including pears and peaches of superior quality. Small fruits, especially strawberries, and grapes are also important. English walnuts and filberts are extensively grown.

Of field crops, hops, cereals, hay and potatoes are most important. Oregon has 14,000 acres devoted to hops, about double the acreage of California. Winter and spring wheat, barley and oats are the chief cereals. The annual hay crop is about 2,000,000 tons and about 5,000,000 bushels of potatoes are raised each year.

In the dry regions of the Cascades irrigation is necessary. Because of the cost of irrigating, the land is usually held by large companies and rented to farmers in small sections. The Umatilla and Oregon Klamath projects, representing over \$10,000,000 investment, are under Federal control. There are large grazing areas in the eastern part of the state, and horses, cattle and sheep are reared in large numbers.

Forests. The national forest areas cover 13,400,000 acres, the amount of lumber cut from these forests is exceeded only by the cut in Idaho and Montana. Oregon has about one-fifth of the standing timber of the entire United States. Of first importance as a timber tree is the Douglas fir, or Oregon pine, which grows to a height of 300 feet. This splendid tree is surpassed in

the United States only by the yellow pine in extent of commercial use Other important woods are the Sitka spruce, yellow and white pines, hemlock, cedar, juniper, laurel, oak and maple

Mineral Resources. Although mining is not the leading industry Oregon has profitable deposits of a variety of minerals The value of the output of all minerals is between \$5,000,000 and \$6,000,000 Gold, found in Baker County, in the Blue Mountains and in the west is the most valuable product of the mines The annual yield is worth from \$300,000 to \$400,000 The silver output is of less importance amounting to some 8,000 ounces Coal, copper, granite and other building stones, clay products, gypsum and platinum are also mined

Fisheries In the value of all fishery products Oregon ranks sixteenth among the states, but its Columbia River salmon fisheries are among the most valuable in the world Astoria is not only the chief center in Oregon for the catching and canning of this fish, but the most important in the world (see SALMON) Along the coast white sturgeon, halibut, oysters and Oregon trout are taken in profitable quantities

Manufactures The extensive forests have made lumbering the chief manufacturing industry of the state The centers of activity are in the basin of the Columbia River The largest mills are located at Portland and Astoria, and in the southern end of the Willamette Valley, at Eugene and Springfield The canning and preserving of fish and fruits constitutes another leading industry Other important industries are furniture manufacturing, in which Portland leads all other cities on the Pacific Coast, paper and pulp, flour and grist milling, slaughtering and meat packing Manufactured goods have an average annual value of about \$400,000,000.

Transportation and Commerce. The northern and western parts of the state are well supplied with railroad lines, but the section east of the Cascades is not so well served The Oregon & Washington Railroad & Navigation Company is the most important road It extends the whole length of the Columbia River west of Portland The Spokane, Portland & Seattle line runs along the river east of Portland The main line of the Southern Pacific runs west of the Cascades and into California There is a railway in the Deschutes valley, and the

northeastern section of the state is provided with railroad facilities In all, the state has over 5,000 miles of steam railway, there are over 500 miles of electric road and 4,500 miles of surfaced roads

One of the most beautiful highways in the world is the automobile drive called the Columbia highway, which traverses the Cascades to the base of Mount Hood Every section of the state can be reached over dustless highways The Pacific highway, paved from Canada to the Mexican border, is one of the most important avenues of travel and commerce It passes through the valleys of the Willamette, Rogue and Umpqua and enters California 60 miles north of Mount Shasta The Oregon Coast highway connects with the Redwood highway at Crescent City, California

There are over 2,100 miles of navigable waterway in the state The Columbia is navigated by ocean steamers to Portland and by river vessels to Lewiston, Idaho The Willamette is navigable between Portland and Eugene, a distance of 150 miles, but is used commercially only between Portland and Salem, a run of 50 miles The Deschutes River is used for local transportation

The state carries on an extensive commerce, with Portland as the most important shipping point This city enjoys a flourishing export trade in grain, flour, lumber, canned goods and salmon by means of the regular steamship connections with the American Pacific ports and the Orient The broad estuary of the Columbia affords an excellent land-locked harbor

Education Oregon is one of the leading states in per capita expenditure for public education, consequently its percentage of illiteracy is very low The state enjoys the use of a rapidly increasing fund from the sale of public lands liberally granted to the state by the national government After a federal survey was made in the state the state board of education unified all state-supported institutions of higher education into a closely coordinated system The state university is at Eugene, the State Agricultural College at Corvallis, the Oregon Medical School at Portland, the Oregon Normal School at Monmouth, the Southern Oregon Normal School at Ashland, and the Eastern Oregon Normal School at La Grande Other institutions of importance are Willamette University at Salem, Pacific University at

Items of Interest on Oregon

The initiative and referendum were first exercised by the people in 1904, when a local option liquor law and a direct primary law were passed

Oregon was the first state to grant complete home rule to the cities by passing a law in 1906 giving cities and towns the exclusive right to enact or amend their own charters and providing for the initiative on special or local legislation

The recall has been adopted, a system by which the voters at a special election may remove from office any local official after six months' service

The state constitution forbids any bank or banking company in the state to issue bills, certificates, promissory notes or other paper to circulate as money

The coast consists of long stretches of sandy beach broken occasionally by spurs of the Coast Range, which project into the sea and form rocky headlands

The state as a whole has an average elevation of 3,300 feet, the summit of Mount Hood, 11,225 feet, is the highest point in the state

Southern Oregon has many lakes, of which the largest are Harney, Malheur, Albert, Warner, Upper and Lower Klamath

Crater Lake, 6,239 feet above the sea, lies in the great pit of a former volcano, the lake has never been known to freeze and its waters are fresh, though it has no visible outlet

The Douglas fir produces more available lumber to the acre than any other American tree

The elementary school pupils number over 150,000 and the high school pupils some 56,000, there are 5,400 elementary and 2,200 high school teachers. The cost of public education amounts to \$17,500,000 annually

Names distinguished in Oregon history are Alexander Mackenzie, Meriwether Lewis and William Clark, John Jacob Astor, Dr John McLoughlin, Elijah White, and Marcus Whitman

For every 9,370 whites in Oregon there

are 22 Negroes, 15 Mexicans, 47 Indians and 81 Asiatics

Questions on Oregon

What is the character of the coast line?

What differences in climate exist between the western and the eastern parts of the state? What mountains are the dividing line?

Compare Western Oregon's winter climate with that in states a thousand miles east

What is peculiar about Crater Lake?

Name five important crops

How does Oregon rank in the production of hops? Salmon?

Name six mineral products

What manufacturing industry takes first rank?

How many miles of railway are there in the state?

What are some of the innovations in government adopted by Oregon in recent years?

Why is Portland noteworthy?

When was Astoria founded? For what purpose? For what industry is it now a great center?

Why is Oregon called the "beaver state"?

What is the state's rank in population and area?

Account for the aridity of Eastern Oregon

How was Oregon honored at the Panama-Pacific Exposition?

How does the state rank in amount of lumber cut from national forest areas?

What railway companies have trunk lines or branches in Oregon?

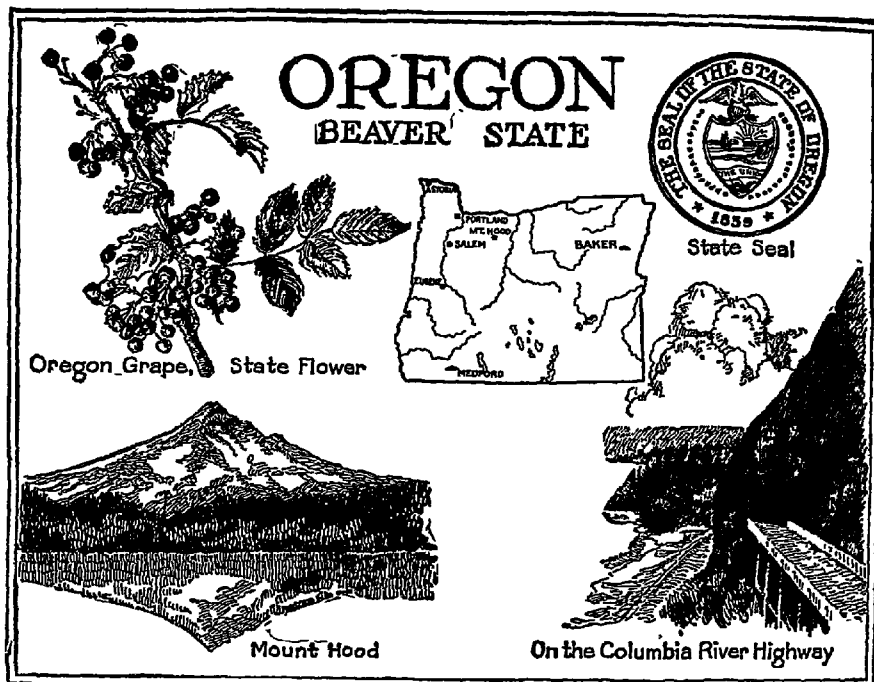
What early explorers visited the Oregon country?

What was meant by the slogan "Fifty-four forty or fight"?

When did the people first exercise the power of the initiative and referendum?

What is meant by the recall?

What memories will stand out most vividly after one visits Oregon?



Forest Grove, Albany College at Albany, Linfield College at Linfield, Pacific College at Newberg, Reed College at Portland and Marylhurst at Oswego

Institutions The charitable and penal institutions are thus distributed over the state At Salem, a state hospital, a tuberculosis hospital, training and industrial schools, institutions for the deaf, blind and feeble-minded, the penitentiary, at Pendleton, a state hospital, at Roseburg, a soldiers' home, at The Dalles, a tuberculosis hospital, at Portland, an institution for the blind, at Woodburn, a state training school

Government Oregon is governed under the first constitution, which was effective in 1859 The political history of the state is a story of steady progress in the extension of popular rights Oregon began nominating its Senators by primary elections in 1901; in 1903 the initiative and referendum went into effect, being applicable to acts of the legislature and to amendments to the constitution All elective officers may be recalled by the voters.

The legislature consists of a senate which cannot exceed thirty members, and of a

house which cannot exceed sixty members, the senators are elected for four years and the representatives for two years The legislature meets every two years The executive department consists of a governor, secretary of state who is ex officio auditor, treasurer, and superintendent of schools The governor, secretary of state and treasurer may not serve more than two terms in twelve years

The judiciary is composed of a supreme court of one chief justice and six associate justices elected for six years, the circuit courts each having one judge and sitting in each county twice yearly, the county or probate courts, and the justices of the peace

History. Drake discovered the coast of Oregon in 1578, and two centuries later, in 1778, Captain Cook visited Nootka Sound In 1792, Vancouver surveyed the entire coast and ascended the Columbia River, having been preceded by Robert Gray, in the ship Columbia, for which the river was named Spain claimed the region by exploration as early as 1603, and the United States claimed it by reason of Gray's voyage, referred to above

Astoria was established in 1811 by John Jacob Astor, two years later it was captured by the British, but was restored to the United States in 1818 by a convention establishing a system of joint control. By a treaty in 1827 this arrangement was continued, neither party forfeiting its claim. Americans in 1844 demanded "fifty-four forty or fight", the British demanded the region as far south as the Columbia River. The boundary was finally fixed at 49°, by a treaty in 1846. In 1834 an American settlement was made in connection with the Oregon mission of the Methodist Episcopal Church under the direction of Jason Lee. Fourteen years later Oregon became a territory. It was admitted to the Union in 1859 with a constitution that forbade slavery but that prohibited Negroes from entering or living within the state, a provision that has long been ignored.

Special legislation has been passed safeguarding the rights of the poor in courts, of discharged convicts and of women workers. Capital punishment which had been previously abolished was restored in 1922. A rural credits system and a soldiers' loan and bonus plan have been put into operation. Laws provide for the use of campaign textbooks, a presidential preference primary, and a verdict in civil cases by three-fourths of the jury.

Related Articles titles for additional information	Consult the following
Astoria	Medford
Cascade Range	Pendleton
Coast Range	Portland
Columbia River	Salem
Dalles The	Snake River
Eugene	Whitman Marcus
Hood Mount	Willamette

ORESTES, *o res'tees*, in Greek mythology, the son of Agamemnon and Clytemnestra.



PURSUED BY THE FURIES
From an ancient vase

When Agamemnon was killed by Clytemnestra and her lover Aegisthus, Orestes was

saved by his sister Electra and sent to the court of his uncle, where he was brought up. On becoming a young man he returned to Mycenae and avenged his father's death by killing both his mother and her lover. For this crime he was relentlessly pursued by the Furies, who drove him in madness from land to land. At last he was informed by the oracle at Delphi that he would be forgiven if he brought back from Tauris to Greece a certain statue of Diana. When he arrived in Tauris, he found, as priestess in the temple of Diana there, his sister Iphigenia. The story of Orestes was the subject of some of the greatest dramas of ancient Greece.



ORGAN, from the Greek *organon*, meaning an instrument, is one of the greatest of musical instruments. The pipe organ is probably the offspring of the water organ of the Greeks, and from the fourth century A D it has been steadily developed and improved. The three essentials of an organ are (1) a chest of compressed air, (2) a set of pipes, producing musical sounds, in communication with this chest,

(3) a keyboard, by means of which this communication may be opened or closed at pleasure. The air is forced into the wind chest by means of bellows, which are operated by water power, by electricity or by hand. To the upper part of each wind chest is attached a *sound board*, a contrivance divided into as many grooves as there are keys, for the passage of wind. Air is admitted into these grooves by means of valves, or pallets, connected with the keys, the transmission of air and consequently the quality of the tone produced, is regulated by the *register*, or *slide*. The series of pipes above each slide is called a *stop*. The principal stops of an organ are the *open*, *stopped* and *double diapasons*, the *principal*, *dulciana*, *melodia*, *solicional*, *flute*, *trumpet*, *clarion*, *bassoon*, *oboe* and *vox humana*.

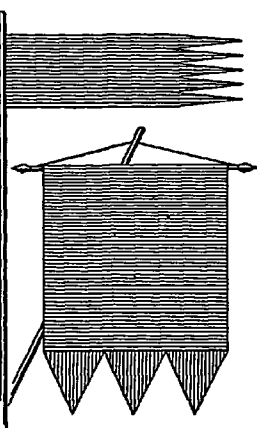
An organ may have several wind chests filled by the same bellows, and several keyboards, each keyboard and wind chest representing a distinct organ and connected with a separate group of pipes. In the largest

instruments these organs are five in number, namely, the *great organ*, the *chour organ*, the *swell organ*, the *solo organ* and the *pedal organ*. The keys for the hand are termed *manuals*, the parts operated by the feet, *pedals*. The most common compass of the manuals is from CC to F, four octaves and a half, that of the pedals from CCC to E or F, two and a quarter to two and a half octaves. There are two kinds of organ pipes—*flute pipes*, or *mouth pipes*, and *reed pipes*. There are several kinds of each, the character and quality of their sound depending mainly on the material employed in their manufacture (wood or metal), their shape and their dimensions.

In 1863 a contrivance was patented for transferring some of the work from mechanism to electro-mechanism. An organ built on this principle is termed an *electric organ*. It facilitates the playing and enables the organist to sit at a keyboard at a distance from the instrument. Among the largest organs are those in Saint Peter's in Rome, in the Seville Cathedral, in Haarlem, Holland, in Notre Dame, Paris, in the Auditorium, Chicago, and in the Mormon Tabernacle, Salt Lake City.

The instrument known as *harmonium*, *melodeon*, or *reed organ*, is only an organ with reed pipes and a bellows operated by the feet of the performer. It has foot pedals.

ORIFLAMME, *or's flam*, a red silk banner, having across the bottom three green points, which was borne on the tip of a spear. Originally it belonged to the abbey of Saint-Denis, but in Charles VII's reign it became the royal standard of France. As late as 1415 a red streamer with five points used by the French army also was called an oriflamme.



ORIFLAMME

ORILLIA, *oril'eah*, ONT., in Simcoe County, on the Canadian National, and

Canadian Pacific Rys. Though especially noted for the fine scenery in its vicinity, Orillia is also an industrial center. The important manufactures are cheese, clothing, flour, boats and canoes, cement, woolen goods, wood specialties, furniture and wood pulp. There is a collegiate institute, an opera house, an asylum for the feeble-minded, a Y M C A and a Carnegie Library. Population, 1931, 8,183.

ORINOCO, *orino'ko*, a great river of South America, in volume ranking next to the Amazon and Paraná, and with its tributaries, the Guaviare, the Meta and the Apure, draining most of the northern part of the continent. From the Parima highlands of Venezuela, where it rises, it flows northwest as far as the Colombia boundary, turns northeast for about 300 miles, then takes an eastward course and finally pours into the Atlantic through a great delta formed by fifty branches and covering an area of 7,000 square miles. Throughout its entire length of 1,500 miles it flows through an exceedingly fertile region, much of the way through virgin tropical forests of growth so dense as to be inaccessible to man. About 700 miles from its mouth are the wonderfully picturesque Atures rapids. Below and above these the river is navigable, though there is little trade, owing to the fact that much of the country on its banks is sparsely inhabited. Ciudad Bolívar, 260 miles from the Atlantic, is the chief trading point.

O'RIOLE, a beautiful bird of brilliant color, belonging to the family of the same name. The best known species, the golden oriole, a native of America, the European continent and the British Isles, is a bright yellow bird with black feathers on back, wings and tail. Its nest is a deep pocket lined with wool, suspended from forked branches. The eggs are white or salmon colored, with purplish spots. A similar oriole is native to India.

ORION, a hero of Greek mythology, about whom various myths are told. The most common of these tells how, for his attempt to carry off Merope, whom he loved, he was blinded by her husband Oenopion. Vulcan, took pity on him and gave him one of his servants as a guide to conduct him to the sun god, by whom he was restored to sight. Diana, coming upon him while hunting in the forest, fell in love with him, but her brother, Apollo, became very angry with her for lov-

ing a mortal One day Apollo taunted Diana about her skill with the bow and arrow, and declared that she was not able to strike a certain dark object on the surface of the ocean, which he pointed out to her Diana shot and struck the object, totally unaware that it was the head of her favorite, Orion, who was bathing in the sea Inconsolable for his death, she placed him with his dog Sirius in the sky, as the constellation which still bears his name See ORION

ORION, the most brilliant of the constellations It is on the celestial equator, southeast of Taurus By the ancients this constellation was represented by the figure of a man with a sword at his side

The belt is formed by three stars of the second magnitude, and below them are three other stars, in the midst of which occurs a hazy spot This is not a star, but a great nebula, which through the telescope is a magnificent object The red star which marks the right shoulder of Orion is Betelgeux and the blue star at his left foot is Rigel Both are of first magnitude. Other stars mark the right shoulder and head



ORION

ORKNEY, *aurk'n*, ISLANDS, a group of islands off the north coast of Scotland, from which they are separated by Pentland Firth, a channel four miles wide Thirty of the sixty-seven islands of the group are inhabited Pomona, or Mainland, is the largest, others are South Ronaldshay, Hoy, Westray, Rousay, Stronsay, Sanday and Shapinsay Excepting Hoy, none of the islands has hills of any great height There are no large streams, but there are many lakes and springs The air is moist, but the climate is remarkably mild in winter The chief crops are oats, turnips, potatoes and barley Cattle, sheep and poultry are raised, and fishing is an important industry

It is probable that the Picts originally possessed the Orkney Islands, but in the eighth century, and subsequently, they were occupied by the Northmen In the ninth century Harold Haarfagr attached them to Norway, and for several centuries they were governed by rulers called jarls, who some-

times owed allegiance to Norway, sometimes to Scotland About the middle of the thirteenth century they were transferred to Alexander king of Scotland, but the Norwegians continued to assert their sovereignty James III of Scotland received the islands as a dowry with Margaret of Norway in 1468, and from that time they have belonged to Scotland They constitute a Scottish county, of which Kirkwall is the capital and largest town Population, about 26,000

ORLEANS, *oh'r la ah'n'*, a French royal family, two houses of which have occupied the throne of France On the death of Charles VIII without issue, in 1498, Louis, duke of Orleans, great grandson of their common ancestor Charles V, and grandson of the first duke of Orleans, ascended the throne under the title of Louis XII Henry III, who died in 1589, was the last sovereign of this house, or the Valois-Orleans branch For the House of Bourbon-Orleans, see BOURBON

ORLEANS, FRANCE, about seventy-five miles southwest of Paris, on the Loire It is intimately associated with the life of Joan of Arc (Maid of Orleans), who as leader of the French army in 1428 compelled the English to raise the siege of the city An equestrian statue of the heroine stands in the middle of the principal square The house she occupied is still standing, and has been converted into a museum of her relics Among the interesting features of the city are the Gothic Cathedral of Sainte Croix, a Palace of Justice and two town halls

Orleans is the capital of the Department of Loiret Less important as a manufacturing center than formerly, it still has woolen, pottery and candy factories It was built on the site of an ancient Gallic town which was destroyed by Caesar It was a place of importance under the Merovingian kings and under the early kings of France It was taken and retaken more than once in 1870 during the Franco-German War Population, 1931, 71,606

ORLEANS, LOUIS PHILIPPE JOSEPH, Duke of (1747-1793), called Philippe Egalité In 1769 he married a rich woman, and bought popularity which rendered him obnoxious to the court He was exiled in 1771 for his opposition to Maupeou, but returned in 1774 In the Assembly of Notables he showed himself hostile to the king and was sent to England, ostensibly on a diplomatic

mission On returning he joined Danton's party, renounced his titles, assumed the name Philip Egalité (equality), and in the troubles which followed voted for the death of the king. Suspected of duplicity, he was tried before the revolutionary tribunal, condemned and executed.

ORLEANS, MAID OF See **JOAN OF ARC**
ORLEANS, PHILIPPE, Duke of (1640-1701), only brother of Louis XIV of France. He was created Duke of Orleans in 1661 and shortly afterwards married Henrietta Maria of England (sister of Charles II), whose sudden death later was attributed to poisoning. Subsequently he married Charlotte Elizabeth, daughter of Charles Louis, Elector Palatine. This second marriage was arranged by Louis to secure the neutrality of the Elector in the approaching war against Holland. Monsieur, as the duke was usually called, distinguished himself in this and in later wars and thus incurred the king's jealousy, which kept him thereafter in the background.

ORLEANS, PHILIPPE, Duke of (1674-1723), regent of France during the minority of Louis XV. In 1692 he married Mademoiselle de Blois, the legitimized daughter of Louis XIV. He distinguished himself in the war of the Spanish Succession, but was recalled because he was suspected of intriguing for the crown of Spain. On the death of Louis XIV, in 1715, he was appointed regent. On acceding to power he found the finances in extreme disorder and endeavored to improve matters by retrenchment and peace; but his reckless introduction of a vast paper currency brought the nation to the verge of bankruptcy (see **LAW, JOHN**). As regent he displayed brilliance and (usually) judgment, but he set an example of dissolute manners which made his regency one of the most corrupt periods in French history. He resigned the government to Louis XV in 1723.

ORNITHOLOG'Y, that branch of zoology which treats of birds, their description, habits and relationship to man. See **BIRDS**.

ORPHEUS, *or'fe us*, a legendary musician of the ancient Greeks, according to some the son of Apollo. The invention of the lyre, or cithara, was attributed to him, and upon it he played so wonderfully that wild beasts, birds and even fishes were enraptured, the storms were stilled and the sea becalmed with the music. Having lost his wife Eurydice, he descended into Hades in an attempt to bring

her back to life, and his music so moved the deities of the lower world, Pluto and Proserpina, that they consented to her return to earth, if her husband, whom she was to follow, would not once look back until they had reached the upper world. This condition the impatient Orpheus violated, and thus lost his wife forever. He is said to have met his death at the hands of a band of Thracian women engaged in the mystic rites of Bacchus. Another version says that he was slain by Jupiter because his power of bringing back the dead violated the laws of nature. His rescue of Eurydice and his death were favorite subjects for artists.

ORRIS ROOT, the root of several species of irises, especially of the European iris, which, on account of its violetlike odor, is employed in perfumery and in the manufacture of tooth powder. It was formerly used quite freely as a medicine.

ORSINI, *or'se'ne*, one of the most illustrious and powerful families of Italy. It became prominent about the eleventh century, having acquired high rank and extensive possessions in the Papal States. The feud between the Orsini and Colonna families is celebrated in history, it commenced toward the close of the thirteenth century and was distinguished for bitterness, unscrupulousness and violence. Many of the Orsini became military chiefs, two of them were Popes—Giovanni Gaetano, who was raised to the pontificate in 1277, with the title Nicholas III, and Vincenzo Marco Orsini, who succeeded Innocent XIII in 1724 as Benedict XIII.

ORTHO CERAS, *or tho's'e ras*, a genus of fossil mollusks distinguished by straight, cone-shaped shells. These fossils are abundant in the formations extending from the lower Silurian to the Triassic. In structure they resembled the nautilus, except that their shells were straight, instead of curved. The shell was divided into numerous chambers by cross partitions, each of which had a small opening in the center. Some species were small, while others were very large. The shells of some species found in the Trenton limestone are as large around as a barrel, and the sections found indicate that the animal must have been from twelve to fifteen feet long. In all, remains of about 200 species have been discovered. See **GEOLOGY**.

ORTHOCLASE, *or' tho klase*. See **FELDSPAR**.

ORTHOGRAPHY, or *thog'ra fi*, a word derived from two Greek words, *orthos*, which means *straight* or *correct*, and *graphein*, which is the Greek for *to write*. Orthography, then, may be understood as a branch of the art of speaking and writing correctly, however, the subject is confined to *words*, not to sentences or paragraphs, and relates to *spelling* alone. We are studying orthography when we seek to learn the sounds a word contains, to know how to divide it into syllables, and to pronounce it correctly, every letter given its proper sound, and accent placed on the proper syllable.

The mastery of this subject, in most particular detail, is the work of the expert in the department of language, but the general principles—entirely sufficient for the average man or woman—may be easily understood, and such a grasp of orthography is plainly necessary if one would speak and write correctly those words we ordinarily use. Unless one knows how the various letters in the written alphabet stand for the sounds in the spoken language, and is acquainted with the general rules for combining letters in the formation of words, he will always be liable to embarrassing errors in pronunciation and spelling and must be decidedly at a disadvantage in both his social and his business life. To meet the needs of the general reader who wishes to make an elementary study of orthography, the essentials of the subject are carefully set forth in the following paragraphs.

Diacritical Marks. In the English language there are many more spoken sounds than letters to represent them. The letters are twenty-six in number, and one of these is not really needed, there are forty-three sounds, most of them very important and not difficult to utter, while a few express tones seldom sounded correctly in our speech. The letter with which we could dispense is *c*, for its soft sound, as in the word *ice*, and its hard sound as in *call*, might well be represented by the letters *s* and *k*.

As there are forty-three sounds in the English language and only twenty-six letters to represent them, it is evident that a single letter must serve to represent more than one sound. The various sounds of a letter as used in different words are represented by means of symbols, or signs, placed either above or below the letter, as a guide to pronunciation. When once the exact tone demanded by a

symbol is learned, the ability to pronounce correctly has been acquired.

Classification of Sounds. According to the kinds of sounds that they represent, the letters of the language are divided into two classes, known as vowels and consonants. Vowels are open sounds made by an unobstructed passage of the breath through the vocal organs. The letters that indicate these sounds are *a, e, i, o, u* and sometimes *w* and *y*. Consonants are sounds formed by a stoppage of the breath in the mouth or the throat.

Sounds are said to be *vocal* when they have a tone or voice quality, and *aspirate* when they are merely breath sounds. The vowels are pure vocal sounds since they have tone qualities that are expressed without any obstruction. In the case of several of the consonants, however, the tone quality is suppressed or obstructed by the organs of speech, and the sounds are therefore known as subvocals. When two vocal sounds are combined, as in *oi* in *voice*, the resulting sound is known as a diphthong.

In the paragraphs which follow all the sounds of the vowels are classified and explained by proper diacritical marking, in each instance, the sound of the letter as marked is indicated by examples of words in common use.

Vowels

A vowel sound is a free and uninterrupted sound of the voice. The various vowel sounds are modified by changed positions of the tongue and lips. A study of the following paragraphs will enable you always to pronounce any word found in the course of your reading.

The Vowel A. There are eight sounds of the vowel *a*, each is explained below.

(1) The long sound of the letter is called its name letter. In the words—

āge māy plāte

the long sound of the vowel is represented, and the sound is denoted by a straight line above the letter, called a *macron*.

(2) The short sound of *a* is heard in the words—

măt hăm plăd

and is represented by a curved mark directly above the vowel called a *breve*.

(3) There is a broad sound of *a* heard in—

all cāll stālk

and it is always represented by two dots, called a *dieresis*, placed below the vowel. The former spelling of this name is *diaeresis*.

(4) One of the common sounds in *a* is heard in—

arm far palms

and is called the "Italian" sound of the letter, because characteristic of that language. It is heard as well in the Spanish and German. The mark is the dieresis above the *a*.

(5) The soft Italian sound is heard in—

ask pass bath

and the single dot above the vowel is its mark. The sound is about midway between the short sound, as in *pat*, and the Italian sound, as in *barn*.

(6) A sound of *a* which is like the short sound of *o* appears in—

was what swan

and demands a single dot below the vowel.

(7) A sound of *a* very similar to the short sound of *e* (see below) is noted in—

sengate village

and the mark is called the suspended bar and is placed under the vowel.

(8) A somewhat difficult sound of *a* appears in—

câre pârent

About the easiest way to explain this sound is to say that it is nearly equivalent to the sounds of *a* and *e* short, run together. The inverted *v*-shaped mark above the letter is called a *circumflex*.

The Vowel E. The three sounds of the letter *e* are graphically illustrated below.

(1) The long, or natural, sound is heard in—

êve êra stêam

The mark is the macron, above the letter.

(2) The short sound of the letter *e* is found in the words—

mêt ênd friênd

and the distinguishing mark is the breve.

(3) In a fairly large list of words such as—

êrr hêr fêrn

the vowel has the same sound as *u* in *urge* and *u* in *sir* (see below). The diacritical mark denoting this sound is called a *tilde*, or *wave*. *Tilde* is pronounced in two syllables, til'de. The name comes from a foreign language, the Spanish, where it is used over the letter *n* to denote a following sound similar to *y*, as in *cañon*.

The Vowel I. (1) The long sound, or name sound, of *i* is heard in—

ice tie item

The distinguishing mark is the macron, a straight line above the vowel.

(2) The short sound of *i* is heard in such words as—

bit tin skim

and, as in all other short sounds, the distinguishing mark is the breve.

(3) In a considerable number of words, takes the sound of other letters, in—

machine quarantine

the sound is that of long *e*, and the mark is the two dots above the letter. In

fir sir stir

the tilde denotes the same sound as uttered in *u* in *urn* and *burn*.

The Vowel O. The sounds of *o* are marked with the same devices as the preceding vowels.

(1) The long, or natural, sound of *o* is heard in—

ôar fôe tône

and the macron is used above the letter.

(2) The short sound of *o* is used in such words as—

nôt lôt spôt

and its distinguishing mark is the breve.

(3) In a large number of words such as—

move prove

the sound is the same as though *oo* were present, as, *proof*. When this sound is to be uttered and there is but one *o*, the dieresis is used below the vowel. In such words as—

môön sôön

if it is desired to use a mark of pronunciation the double macron is used above the letters.

The Vowel U. (1) The long sound of *u* is heard in—

ûse dûty cûbe

and is distinguished by the macron above the letter.

(2) The short sound of *u* appears in—

bût sîn stûmp

and its mark is the breve.

(3) A common use of *u* is found in such words as—

ûrn ûrge

and the vowel is marked with the circumflex, as in (8), in the preceding column.

Diphthongs. A diphthong is a sound produced by running together two vowel sounds in the same syllable. It is called a *proper diphthong* if both vowels are sounded. Examples are *oi* in the word *oil*, *oy* in *boy*, *ou* in *out*, and *ow* in *cow*. An *improper diphthong*, or *digraph*, is merely a union of two vowels in the same syllable, only one of which is sounded. An example is found in the words *rain*, *teach*, *audible*.

Triphthongs A triphthong is a sound produced by running together three vowels in the same syllable. Technically, a proper triphthong would be one in which all three of these vowels are sounded, but there is no such instance in the English language. The only triphthong is the improper, or *trigraph*, in which three vowels appear in the same syllable but only one of them is sounded. Examples of the improper triphthong, or *trigraph*, are found in the words *adieu* and *beauty*.

Vocal Equivalents The teacher, parent or student will find much help in learning correct pronunciations of words if the following table of vowels and their equivalent sounds is studied until it is thoroughly understood.

Consonants. The consonant sounds of the alphabet are best learned by observing how the letters they represent are sounded in spoken words. The following table of aspirates and subvocals will materially assist one to master these sounds.

TABLE OF ASPIRATES

f	as in far
h	as in hand
k	as in kind
p	as in pen
s	as in sin
t	as in tip
th	as in through
sh	as in shore
ch	as in chick
wh	as in whirl

TABLE OF SUBVOCALS

b	as in band
d	as in dead
g	as in gun
j	as in joy
l	as in lip
m	as in men
n	as in none
ng	as in sung
r	as in tar
th	as in then
v	as in vain
w	as in went
y	as in yacht
z	as in zinc
s	as in treasurer
sl	as in version

In the spelling of English words we occasionally use a letter whose sound in the word is that of another letter or other letters.

As an illustration, in the word *omon*, the first *n* is sounded as though it were *ny*. Other equivalents will be noted in the following table.

TABLE OF VOCAL EQUIVALENTS

a	as in what	ö
ä	as in här	ē
ê	as in there	â
ë	as in they	ā
ī	as in police	ē
î	as in firm	ē
ô	as in ought	ä
ó	as in some	ü
o	as in tailor	ē
o	as in to	oo
o	as in world	oo
u	as in mule	oo
u	as in fur	oo
y	as in cry	i
y	as in badly	i
y	as in myrtle	ē

SUBVOCAL AND ASPIRATE EQUIVALENTS

ç	as in mige	s
c	as in catch	k
g	as in grin	j
n	as in pink	ng
ñ	as in onion	ny
ç	as in phase	z
x	as in box	ks
x	as in exact	gz
ph	as in sylph	f
qu	as in quick	kw
qu	as in croquet	k

Syllabication and Accent

Consonant and vowel sounds are combined in groups known as syllables, and these groups are in turn united to form words. Sometimes a single vowel may form a syllable, but a consonant cannot be thus used alone, it must always be combined with a vowel. The syllables of which a word is formed must be carefully noted, for in pronunciation one of the syllables of the word is distinguished by special emphasis or accent, and the others must be clearly enunciated, and in writing it frequently happens that the parts of a word must be separated at the close of a line, thus requiring a proper division into syllables. A general rule for the division of a word into syllables is that if two consonants occur between two vowels, one goes with each vowel, and that when but one consonant comes between two vowels the consonant usually goes with the second vowel.

When a word consists of but one syllable, pronunciation depends wholly upon correct utterance of the sounds of which the word is composed; but when there are two or more syllables, proper placing of the accent becomes one of the essentials of pronunciation. See SPELLING.

ORTHOPEDIOS, *awr tho pe'dihs*, a modern branch of medical science, relating to the prevention and cure of natural deformities. Preventive treatments are given to infants and delicate children by hygienic care, such as pure air, careful nursing and suitable food, clothing and exercise. Cures are attempted by means of special mechanical apparatus and methodical muscular exercises, but the course of treatment is likely to prove ineffective unless work is begun soon after the deviation from the natural shape begins. The manufacture of orthopedic apparatus has become highly developed and forms an important branch of trade.

ORTHOPTERA, a large group of insects, including katydids, grasshoppers, locusts, crickets, cockroaches and the odd-looking walking sticks. While not so prolific as some other kinds of insects, most species are represented by large numbers, owing to skilful self-preservation. Some of the orthoptera are among the oldest insects, as indicated by fossil remains. They have four wings, the upper tough and somewhat hardened, lying straight along the body, and covering the hinder ones, except when in flight. Some species, though having wings, cannot fly. There are about 10,000 species. See INSECTS, and special articles on the insects mentioned above.

ORTOLAN, a species of bunting found on both coasts of the Mediterranean Sea. Its head and back are brown, touched with white; about its eyes and covering its throat the plumage is yellow. The birds are regarded as among the choicest table delicacies, and hundreds of them are caught in nets annually in the south of France, in Italy and in Cyprus, and are fattened for the table.



ORTOLAN

OSAGE, *o'saje*, a once important Siouan tribe of Indians, now living on a reservation

in Oklahoma and enjoying the distinction of being the richest tribe in the United States. Originally they occupied extensive territory in what are now the states of Missouri, Arkansas and Kansas. These holdings they sold to the United States government, which paid them a good price. They have also prospered through the collection of royalties for the working of oil wells on their reservation. The 2,000 members of the tribe are among America's richest Indians.

OSAGE, a river which rises in Lyon County, Kansas, flows eastward and after a course of about 500 miles enters the Missouri River nine miles below Jefferson City. It is navigable for small vessels for about 200 miles from its mouth.

OSAGE ORANGE, a tree native to North America, especially to the southwestern part of the United States, where it is frequently used as a hedge plant. The wood is yellow, tough and satiny, and was formerly much used for bows by the Indians. The tree grows to a height of from thirty to sixty feet. The fruit is large and round and has a pale yellow skin the texture of orange peel. It is not edible.



OSAGE ORANGE

OSAKA, *o sah'ka*, or **OZAKA**, *o zah'ka*, JAPAN, on the island of Hondo, one of the three imperial cities of the empire. It is situated on the shore of Osaka Bay, at the mouth of the Yodo River, twenty miles from Kobe. Osaka has a thriving inland trade, but the harbor is inadequate for the accommodation of large vessels, and the foreign commerce is not large. As a manufacturing center, however, the place is one of the leading Japanese cities, maintaining prosperous manufactories of cotton, glass, iron and steel products, boots and shoes and other commodities. Shipbuilding is also an important industry. The city is the seat of a government mint and contains the headquarters of Osaka military district. Because of its

numerous canals and bridges Osaka is known as the "Venice of the East." Among its notable buildings are several temples and a famous castle Population, 1930, 2,453,573

OS'CAR I (1789-1859), king of Sweden and Norway, son of Charles XIV John During the reign of his father he was three times viceroy of Norway, where he made himself popular by his just administration He acceded to the throne in 1844, reformed the civil and military administration of the state, abolished primogeniture, established complete liberty of conscience, encouraged education and agriculture and removed the political disabilities of the Jews He took little part in foreign politics

OSCAR II (1829-1907), king of Sweden and Norway from 1872 to 1905, from the latter date, king of Sweden only. Although he showed himself from the first willing to grant concessions to the Norwegians, he steadily opposed their efforts for independence Despite his opposition, however, matters came to a crisis in 1905, and Norway was lost to him Oscar was a writer of some merit, he translated Goethe's *Tasso* into Swedish, and published several volumes of lyric poetry

OSCEOLA, *os e o'lah*, (1804-1838), a celebrated Indian chief His father was an English trader, William Powell, and his mother was the daughter of a Creek chief Osceola grew up among the Seminoles of Florida and became their leader. His wife, the half-breed daughter of a negro slave, was seized and carried away by the former owner of her mother This so embittered Osceola that he became one of the most terrible enemies the whites ever had Imprisonment and punishment did not subdue him, and he took murderous revenge at every opportunity. In October, 1837, while carrying a flag of truce to General Jessup, he was treacherously seized and kept a prisoner in Fort Moultrie until his death



OSCEOLA

OSEL, or **OESSEL**, *o'sel*, an island in the Baltic Sea, renamed Saare, a part of Estonia (which see). The island is situated at the

entrance to the Gulf of Riga Its area is about 1,000 square miles. The surface is undulating, the climate is mild, and grains, including wheat, can be produced Agriculture, the rearing of horses and fishing are the principal occupations of the inhabitants Population, estimated, 42,000

OSE'AWA, ONT, on Lake Ontario, thirty-two miles northeast of Toronto, on the Canadian Pacific and Canadian National railways Here are large automobile plants, also manufacturing of sheet metal products, glass, textiles, and numerous other articles There is a collegiate institute, a Carnegie library, an armory and a hospital Population, 1931, 23,439.

OSE'KOSH, WIS, the county seat of Winnebago County, eighty miles northwest of Milwaukee, on Lake Winnebago, at the mouth of the Upper Fox River, and on the Minneapolis, Saint Paul & Sault Ste Marie, the Chicago & Northwestern, and the Chicago, Milwaukee, St Paul & Pacific railroads A state teachers' college is here, and the city has a public library, seven hospitals and a clinic and 130 acres in parks Other public buildings are the city hall, the county courthouse and the Federal building, and a ten-story hotel. The lake affords fine fishing, yachting and ice boating State and county hospitals for the insane, a tuberculosis sanitarium and the county poor farm are near the city Oshkosh has an important trade in lumber and extensive manufactures of lumber products, such as sash, doors, blinds, matches and furniture There are also manufactures of machinery, boilers, twine, matting, flour, marine engines, and other articles Statues of the Indian chief Oshkosh and Carl Schurz and a monument to the soldiers of the Civil War adorn the city The place was settled in 1836 and was chartered as a city in 1853 Four different times it has been damaged by fires Population, 1920, 33,162, in 1930, 40,108, a gain of about 21 per cent.

OSIRIS, *o si'ris* In Egyptian mythology, the husband of Isis and father of Horus He was styled the manifestor of good, lord of lords and king of the gods, and was regarded as the source of good, whereas Set, his brother, stood for evil Osiris, after having established good laws and institutions throughout Egypt was murdered by Set and became afterward the judge of the dead There are a multitude of traditions, both Greek and

Egyptian, about Osiris. He is represented under many different forms and is compared sometimes to the sun and sometimes to the Nile. His soul was supposed to animate the sacred bull, Apis, and thus to be continually present among men. His worship extended to Rome, where in time it was superseded by Christianity.

OSKALOOSA, Iowa, the county seat of Mahaska County, sixty-five miles southeast of Des Moines, on the Chicago, Rock Island & Pacific, the Chicago, Burlington & Quincy and the Minneapolis & Saint Louis railroads. The city is in a rich agricultural district. There are extensive deposits of coal, limestone and clay in the vicinity. The principal industrial establishments make cement, stave, silos, hydrants, furnaces, brick, tile and building blocks. There is also a packing house. The city contains Penn College, Oskaloosa College, Central Holmes University, a Carnegie Library and three hospitals. After a destructive fire, Penn College was recently rebuilt at a cost of \$400,000. The annual state meeting of the Society of Friends is held here. The place was settled in 1843, and the city was incorporated in 1853. Population, 1920, 9,427, in 1930, 10,123, a gain of 7 per cent.

OSLER, WILLIAM, SIR (1849-1919), a physician and surgeon, born at Bondhead, Ont., and educated at Trinity College School, Port Hope, at Trinity University, Toronto, and McGill University. Later he studied at the University College of London and at Berlin and Vienna. He returned to Canada in 1874, and was elected to the chair of physiology and pathology in McGill University. From 1884 to 1889 he was professor of clinical medicine in the University of Pennsylvania, when he was called to a professorship at Johns Hopkins University at Baltimore. In 1905 he became regius professor of medicine at Oxford. Sir William won remarkable distinction as a lecturer and also as a physician. He was the author of numerous monographs and articles in medical journals and also published *Cerebral Palsies of Children*, *The Principles and Practice of Medicine*, *The Teacher and Student*, and *Oliver Wendell Holmes. an Address*. While at Johns Hopkins he stated a theory that when men reached the age beyond usefulness, an end should be put to their years. For this he was very widely criticised.

OSLO, NORWAY. See **CHRISTIANIA**.

OSMIUM, *os'mi-um*, a metallic element found in platinum ore. It is bluish-white and has a bright luster. It is the heaviest of all substances, being twenty-two and one-half times heavier than water. Osmium is the most infusible of all the metals. It combines with chlorine in different proportions, also with sulphur, and forms alloys with some other metals. Osmic acid acts as a powerful oxidizer, removing the carbon from indigo, separating iodine from potassium iodide and converting alcohol into acetic acid.

OSMO'SIS, the transfusion or mixture of two liquids when they are separated by a membrane, such as parchment. For instance, if a bladder containing a strong solution of sugar be placed in a receptacle containing water, it will be found after a time that a considerable quantity of water has passed through the membrane into the bladder, making it noticeably fuller. At the same time there has been a passage of the sugar solution into the water. The flow from the vessel into the bladder, or the inward flow, is called *endosmosis*, and the flow from the bladder into the passage, or the outward flow, *exosmosis*. The flow is usually unequal, the greater flow being from the light to the denser liquid. When the fluids become of the same density, osmosis ceases.

Osmosis is one of the most essential processes in the growth of plants. The protoplasm is confined within the cells, the walls of which are a thin membrane. Water and any substances it may hold in solution can pass through this membrane, but the protoplasm has the power of selecting those substances which are needed for its own growth, thus, it absorbs from the circulating cell the necessary nutriment.

OSPREY, *os'pray*. See **FISH HAWK**.

OS'SINING, N. Y., until 1901 known as Sing Sing and incorporated under that name in 1813, is in Westchester County, thirty miles north of New York City, on the east bank of the Hudson River and on the New York Central Railroad. There is freight and passenger traffic on the river. It is a beautiful residence town, located on an elevated site, at the widest point of the Hudson River, known as Tappan Sea. The famous Sing Sing State Prison is located just outside the city. Other features of interest are the arch of the Croton Aqueduct and the arched highway bridge. There are educational facilities of high rank, a Carnegie Library and

a hospital Population, 1920, 10,739, in 1930, 15,241

OSSOLI, SARAH MARGARET FULLER, Marchioness (1810-1850), an American writer, born at Cambridge, Mass., known commonly as MARGARET FULLER. She was even at an early age noted for her brilliancy, eccentricity and high temper. Her father gave her a superior education, and after his death she supported the family by teaching languages in Bronson Alcott's school in Boston, and by managing a private school in Providence, R. I. Her brilliancy, and especially her conversational powers, attracted the attention of the most eminent men of New England, and she became closely associated with the Transcendentalists, for a time editing their journal, *The Dial*. She published some translations from German in 1840 and soon afterwards her first original volume, *Summer on the Lakes*, appeared. From 1844 to 1846, the most productive period of her life, she contributed essays on art and literature to the *New York Tribune*.

In the latter year she went to Europe, and in the following year married Marquis d'Ossoli, in Rome. During the revolution of 1848 she served in Roman hospitals, and when the city fell, fled with her husband and their son to Florence and later sailed for America. Their vessel was wrecked off Fire Island Beach, near New York, and all on board were lost. Madame Ossoli, though she wrote little, is regarded as one of the most brilliant women America has produced, her fame resting chiefly on her conversational powers and personal magnetism. Possibly her most important book was *Woman in the Nineteenth Century*.

OSTEND', BELGIUM, a seaport in the province of West Flanders, on the North Sea, fourteen miles from Bruges. Before the World War the city was a famous summer resort, sometimes entertaining 50,000 visitors in a single season. The Kursaal, a magnificent building, is the center of social life in normal times. Cod and herring fishing and the cultivation of oysters are important industries. The city was built in the ninth century. It sustained a memorable siege by the Spaniards from 1601 to 1604, when it surrendered to Spinola. In 1914 it was for a short time the capital of Belgium, but was later taken by the Germans, who held it until October, 1918. The population in 1911 was 42,638; when the city

was retaken by the Belgians there remained only 27,000; but in 1934 there were 48,050.

OSTEND MANIFESTO, a dispatch signed at Ostend, Belgium, October 9, 1854, by James Buchanan, John Y. Mason and Pierre Soulé, at that time United States ministers to Great Britain, France and Spain, respectively. It declared that if Spain refused to sell Cuba to the United States the latter country should forcibly acquire the island. The manifesto, while drawn up at the direction of President Pierce, turned out to be a document of the pro-slavery party. It was not approved in the United States, and nothing ever came of it.

OSTEOPATHY, *os'te op'a thi*, a method or system of treating disease without the use of drugs by manipulation and adjustment of the body to effect restoration of a normal circulation and nerve force to all organs. The principles of this system were first discovered and formulated by Dr. Andrew Taylor Sill, of Baldwin, Kansas, who, dissatisfied with old-school practice, on believing that the body contains within itself the remedy for all disease, founded the first college of osteopathy at Kirksville, Mo., in 1892, after experimenting according to his theory for eighteen years. There are now six colleges of osteopathy in the United States giving a four year course of instruction and training to students. Instruction is given not only by osteopathic physicians but by other leading members of the medical profession. The subjects taught and textbooks used are the same as in all medical colleges, but from a different viewpoint, greater attention being given to osteopathic manipulation and adjustment than to materia medica. The practice of osteopathy has been legalized in the United States and its dependencies. There are more than 8,000 practitioners of osteopathy in the United States, and its practice has extended to Canada, England and several other countries.

OSTRACISM, *os'tra siz'm*, a political measure practiced among the ancient Athenians, by which persons considered dangerous to the state were banished by public vote for a term of years (usually ten), with leave to return to the enjoyment of their estates at the end of the period. Among the distinguished persons ostracized were Themistocles, Aristides and Cimon, son of Miltiades. To-day in English-speaking countries ostracism means social exclusion.

OSTRICH, the largest of the existing birds. It is a native of Africa and Asia, and was formerly found in great numbers in the wild state. After the ostrich plume became a fashionable adornment for women's hats and dress trimming, the bird was hunted and exported in such numbers to stock ostrich farms that it is now extant only in the more inaccessible regions of its native haunts.

Physical Characteristics. The full-grown male stands seven or eight feet high and weighs 200 pounds or more. It has a flat head, a stout beak, large eyes, and small, useless wings. The neck and thighs are nearly bare, but the body is covered with feathers.



OSTRICH AND YOUNG

To the ancients it was known as the *camel bird*, a name suggested not only by its appearance but by its peculiar humping gait. Its voice is similar to that of a lion, but has a peculiar hissing intonation. The males are shiny black, with white wings and tails. The females and young birds are of dull brown color, and when hatched the chicks are striped.

The ostrich is a timid bird and has great speed, often outstripping the fleetest Arabian

horse. When hunted it usually runs in a circle, and while, because of its speed, it is impossible for a single horseman to overtake it, a number of hunters can capture it by surrounding and closing in on their prey. The bird is either lassoed or killed with a spear, rifle, or arrow.

This strange bird, like all other species, is peculiarly fitted to its environment. Its toes, two in number, are padded, thus providing protection from the hot sands of arid places and from rocky soil, where its incredible speed forces a heavy impact with the ground. Furthermore, it can go for several days without water, a fortunate circumstance when it is driven long distances from water supply by wild enemies or by hunters. In defense, its kick has been known to kill men and horses.

The food of the ostrich in the wild state consists of almost anything it can find in the way of herbs, seeds and fruits. In captivity, the birds are usually fed upon alfalfa or some other form of grass or clover, with occasional variations of fruit.

Family Life. In the wild state several females accompany one male, and all lay their eggs in the same nest, which is a mere hollow in the sand. The eggs weigh about three pounds each, with shells so thick and strong that they serve the African natives as bowls and cups. In warm countries the eggs are left to be warmed by the sun during the day and the male bird sits upon them at night. In captivity, however, when the birds attain their full growth, at about four years, they pair, and each pair is kept in a separate enclosure. Here the nest is made, and about eighteen eggs are laid, upon which the female sits during the day and the male at night, forty-two days are needed for hatching.

Ostrich Stock Farms. Large ostrich farms have been established in the southern parts of California and in Arizona, as well as in British South Africa and in other countries where the climate is suitable for raising the birds. They are so voracious that their upkeep proves quite expensive when fashion's vagaries or when interference with commerce, as in the World War, affects the plume market. But if the demand for plumes is great, the industry is lucrative, as an ostrich may attain the age of eighty. The black and white plumes are obtained from the male bird, and the brown ones from the female.

OSWEGO, N Y, the county seat of Oswego County, thirty-five miles northwest of Syracuse, on Lake Ontario, at the mouth of the Oswego River and at the outlet of the Oswego Canal, now a part of the State Barge Canal, and on the Delaware, Lackawanna & Western, the New York, Ontario & Western and the New York Central railroads. The city is on a slight elevation above the lake and has seven parks, broad streets and pleasant drives along the river and lake shore. It contains a state normal school, Oswego City Library, a Federal building, a city hall, a home for the homeless, two orphan asylums, a courthouse and a state arsenal. The city has an excellent harbor and conducts a large trade in coal, grain and lumber. The government maintains a life-saving station. There are machine shops, boiler and engine works, a large starch factory, knitting mills, and factories which make pumps, glucose, gearing, matches and underwear.

Oswego was established as a military and trading post about 1724 and was chartered as a city in 1848. During King George's War and the French and Indian War, it was regarded as a very important position and was the scene of numerous engagements. Population, 1920, 23,626, in 1930, 22,652, a decrease of 5 per cent.

OTHO I (912-973), called **OTHO THE GREAT**, an emperor of Germany and founder of the Holy Roman Empire. He succeeded his father, Henry I, as king of Germany in 936 and was immediately compelled to go to war to maintain his right to the throne. After a struggle of many years he overcame and gained possession of the duchies of Swabia, Bavaria and Lorraine. In 951 he went to Italy and there was crowned king of the Lombards, in 962, after his expulsion of Berengar II, who had seized upon the territory bestowed upon the Pope by Pippin and Charlemagne he was crowned emperor at Rome. The Pope having violated a pledge made to him, Otho invaded Italy and deposed the Pope, causing Leo VIII to be elected in his place. He was later involved in a war with the Byzantine Empire, which had refused to acknowledge his rights.

OTIS, JAMES (1725-1783), an American statesman, born at West Barnstable, Mass., and educated at Harvard College. He practiced law for a time at Plymouth and later at Boston, where he attained a wide reputation. He was elected advocate-general of

Massachusetts, but in 1761, when request was made for the issuance of writs of assistance, he resigned and became the leading counsel in opposition, making a notable speech which brought him into active leadership of the patriot party. He added to his reputation by numerous pamphlets against the British policy, especially his *Vindication of the Conduct of the House of Representatives* and *The Rights of the British Colonies Asserted and Proved*. It was at his suggestion that the Stamp Act Congress assembled in 1765, and he was the author of the address sent by it to the House of Commons. He openly defied the royal authorities of the colony and succeeded in checkmating many of their moves against colonial interests. In 1769 he became involved in a dispute with a British officer and received a cut in the head, which resulted in insanity, from which he never fully recovered. He was killed by lightning at Andover, in the fifty-eighth year of his life.

OTO, o'toh, a small tribe of Siouan Indians which, with the remaining remnant of the Missouri tribe, has occupied a reservation for about one hundred years in what is now Eastern Oklahoma. The Oto and the Missouri speak the same native language, although, with other tribes, they are now highly civilized. The Oto number about 325.

OTOMI, meaning *wanderer*, a Mexican people, in that country before the Aztec occupation, and yet an important part of the population in three of the central states.

OTTAWA, an important tribe of Algonquian Indians who occupied the Upper Ottawa River in Canada. They were friends of the French and so were brought into disastrous conflict with the Iroquois and later with the Sioux. They sided with the English against the Americans in the War of 1812. Pontiac (which see) was a famous chief of this tribe. At present there are a number of Ottawas in the Canadian province of Ontario, the majority of those in the United States live in small settlements in Lower Michigan.

OTTAWA, ILL., the county seat of La Salle County, eighty-four miles southwest of Chicago, at the confluence of the Fox and Illinois rivers, on the Illinois & Michigan Canal and on the Chicago, Rock Island & Pacific and the Chicago, Burlington & Quincy railroads. The city has a very beautiful location and is the seat of Pleasant View

College and Saint Francis Xavier Academy. It has a high school library, Odd Fellows' and Reddick's public libraries, the Illinois Appellate Court building, four public parks and two hospitals. There are deposits of coal, clay and glass sand in the vicinity, and the city has manufactures of implements, glass, pottery and other clay products, playground equipment, and various other articles. It is only a few miles from Starved Rock, famed in Illinois history. The town was settled about 1830 and was incorporated as a city in 1853. The commission form of government was adopted in 1900. Population, 1920, 10,816, in 1930, 15,094.

OTTAWA, KAN., the county seat of Franklin County, forty miles southeast of Topeka, on the Marais des Cygnes River and on the Atchison, Topeka & Santa Fé and the Missouri Pacific railroads. Ottawa University is located here, and the city has a Carnegie library, about a score of churches and Forest Park, where the county fair and Chautauqua assemblies are held. The notable buildings include a county courthouse, auditorium, city hall, and Federal building. There are large nurseries, grain elevators, railroad shops, flour mills, windmill, gas engine and pump works, creameries, foundries and carriage factories, and the city also has a good trade in grain, wool and live stock. The place was founded by John Tecumseh Jones, a missionary to the Indians. The commission form of government is in operation, with a mayor. Population, 1920, 9,018, in 1930, 9,563.

OTTAWA, ONT., the capital of the Dominion of Canada, the county seat of Carleton County and the sixth Canadian city in population, is situated on the south bank of the Ottawa River, 116 miles by rail west of Montreal. It lies at the junction of the Rideau with the Ottawa, and has steamer communication with Great Lakes ports by way of the Ottawa and St Lawrence Rivers. The Rideau Canal connects with Kingston. Ottawa is served by the Canadian Pacific, the Canadian National and the Ottawa and New York railways.

The city is located in a region of great beauty and is itself one of the finest cities of Canada. Among the notable buildings are the government buildings on Parliament Hill (rebuilt since the fire of 1915), the Roman Catholic Cathedral of Notre Dame, Christ Church Cathedral, Rideau Hall (the residence

of the Governor-General), the city hall, the postoffice, numerous churches and the public library, or Library of Parliament, which contains over 200,000 volumes. The chief educational institutions are the Ottawa Roman Catholic University, a collegiate institute, the Ottawa Provincial Normal School and a number of private institutions.

The Ottawa River, which here forms the magnificent cataract known as the Chaudière Falls, furnishes power for numerous foundries, factories, flour mills and saw mills. The principal trade of the city is in its sawed timber, the total amount cut in the mills being hundreds of millions of feet annually. There are also manufactures of iron ware, agricultural implements, machinery, bricks and other commodities. Altogether the city has more than 200 factories, giving employment to thousands of workmen.

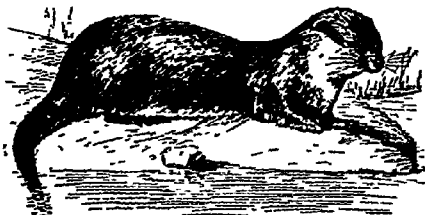
A United States consul-general is located at Ottawa. The town was first settled in 1823 and was made a city, with its present name, in 1854. In 1858 it was selected as the capital of Canada. Population, 1931, 126,872.

OTTAWA RIVER, one of the most important rivers of Canada, the chief branch of the Saint Lawrence River. With its tributaries it floats more lumber than any other water course in the world. The clearing of the timber lands has opened the way for agriculture, and the region it traverses is becoming thickly settled. Ottawa and Hull are the largest cities on its banks.

The river rises in the Laurentian highlands of Ottawa, flows westward then southeast and east, entering the Saint Lawrence through two mouths which form the island on which the city of Montreal is built. The principal tributaries are the Madawasca and Rideau on the right, and the Rivière du Lièvre and Gatineau on the left. Rideau Falls, just above Ottawa, obstruct navigation, but the river is connected with Lake Ontario by the Rideau Canal. After the completion of the Georgian Bay Canal the Ottawa River will form part of the great waterway from the Great Lakes to the Atlantic.

OTTER, a fur-bearing animal that lives in and near water. Otters are found in all parts of the world, though they exhibit considerable differences, according to locality. In general, the body and tail are long and thick, the legs small and short. The head is large and inclined toward flatness, and the eyes and

ears are small The under fur is short, woolly and whitish-gray, covering this is a coat of long, coarse hairs, dark brown in color Otters are expert swimmers and divers, and they live on fish The common river otter makes



THE OTTER

a burrow in the banks of streams and lines it with grass and leaves, and here the young—usually three or four—are reared The *American*, or *Canadian*, otter, about four feet long, including the tail, is much hunted for its fur, which is deep reddish-brown in winter and blackish-brown in summer About 6,000 are killed in Canada annually The dyed fur often passes as a substitute for seal (see FUR AND FUR TRADE)

Sea otters, which make their home on the coasts of the North Pacific, are comparatively rare These animals have deep, lustrous black fur and somewhat resemble small seals This fur is very valuable, a single perfect pelt having been known to sell for \$2,000 Sea otters are timid little creatures, and are caught by shooting, clubbing or netting

OTTO I (1815-1867), king of Greece, son of Louis I of Bavaria In 1832 the Greek National Assembly offered him the throne of Greece, and his reign began the following year, under a regency On attaining his majority in 1837 he assumed personal control, and in the same year married the German Princess Amalie of Oldenburg Heavy taxes and German and Bavarian influence at court caused much dissatisfaction, which in 1843 brought revolution Otto granted a constitution, but the trouble continuing, he was forced to flee the country He never returned, though he never formerly renounced the Greek throne.

OTTUMWA, IOWA, the county seat of Wapello County, is on both banks of the Des Moines River, about ninety miles from Des Moines and 281 miles west of Chicago The river is crossed by three substantial iron carriage bridges and two railroad bridges.

The Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Wabash and the Chicago, Milwaukee, Saint Paul & Pacific railroads serve the city, and there is an airport There are coal mines in and around Ottumwa, which furnish coal for the railroads and for shops and factories The manufacturing produce agricultural implements, steam boilers, mining tools, packed meats, bridges, cigars and candy The largest independent meat packing establishment in the world is here The city has a Carnegie Library, a Y M C A, Ottumwa Heights College, Iowa Success School, a United States government building, and well-equipped hospitals Ottumwa was settled in 1849 and incorporated as a city in 1851 The commission form of government is in operation Population, 1920, 23,003, in 1930, 28,075, a gain of 22 per cent

OUAGHITA, *wash'ita*, RIVER. See WASHITA RIVER

OUDE, *oud* See UNITED PROVINCES OF AGRA AND OUDH

OUIDA, *we dah* See RAMÉE, LOUISE DE LA.

OUNCE, from the Latin *uncia*, meaning a *twelfth part* of any magnitude, is the name of a unit employed in weighing It is equivalent to one-twelfth of a pound, or 480 grains Troy weight, and one-sixteenth of a pound, or 437½ grains, avoirdupois In the United States the apothecaries ounce is the Troy ounce; in Great Britain, the avoirdupois

OUNCE, a beautiful animal of the cat family, called *snow leopard* It lives in the very cold mountain regions of Central Asia Its hair, which is very long, rough and heavy, is nearly white, marked slightly with black, and thus protected the animal is able to creep unperceived over the snow in search of its prey—goats, sheep and such small animals It rarely attacks man The name is often misapplied to the South American jaguar

OUTCAULT, *out'kawlt*, RICHARD FETTON (1863-1928), a newspaper cartoonist, the originator of the "Yellow Kids" and "Buster Brown," familiar to most boys and girls He was born at Lancaster, Ohio, and educated at Cincinnati Since 1895 his drawings have been a regular feature of Sunday supplements of newspapers Some of his characters have appeared on the stage, and nearly all the drawings have been put into book form

OUTRAM, *oo'tram*, JAMES, Sir (1803-1863), a British general and statesman, born in Derbyshire and educated at Aberdeen. He went into service in India, and there won the unbounded admiration of his wild hill troops by his cool daring and astonishing hunting achievements. As adjutant to Sir John Keane, he took part in the Afghan War of 1838 and later helped to put down the Indian Mutiny, acquitting himself with distinction. For twenty-five years he was a conspicuous figure in affairs in India.

OUZEL, *oo'zel*, a name formerly given to the English blackbird and to-day applied to the dipper, a bird related to the wrens and thrushes. The bird is short and squat and of a dusky color above and white beneath. It lives on aquatic insects and fresh-water mollusks, which it braves the depths of streams to capture. The young take to water before they are fully fledged. See **DIPPER**.

OVEN, *uv'en*, BIRD, in the United States, a species of warbler, which builds a domed nest, shaped somewhat like an old-fashioned out-door oven. It is about six inches long, is olive-green above and white, streaked with black, underneath. The bird is distinguished by its sweet chattering at twilight and by its manner of walking with a seasaw motion and nodding head movement. Other species are found in South America.

OVID (43 B C-A D 18), the common name of **PUBLIUS OVIDIUS NASO**, a celebrated Roman poet. After receiving a careful education, completed at Athens, where he gained a thorough knowledge of the Greek language, he traveled in Asia and Sicily, then settled in Rome. There his pleasure-loving temperament and light verse won for him the friendship of a large circle at court. In the year A D 8 Ovid was banished from Rome to Tomi, a town on the desolate shores of the Black Sea, ostensibly for having published *Art of Love*, though in reality perhaps because he knew certain facts connected with a court love affair. In the uncongenial and semi-barbarous environment of Tomi Ovid spent the remainder of his life, in spite of repeated attempts of himself and friends to have the term of his banishment shortened.

Besides the *Art of Love*, Ovid wrote *Fastorum Libri*, a poetical calendar, *Nux*, the complaint of a nut tree over the way it is treated, *Epistolae Heroidum*, letters from heroines to their husbands, and a number of

love elegies. His most famous work is the *Metamorphoses* ("Transformations"), an account of all the transformations described in legend to the time of Julius Caesar. Ovid's poetry lacks depth of feeling, and its moral tone is not high, but it lives by reason of its musical quality.

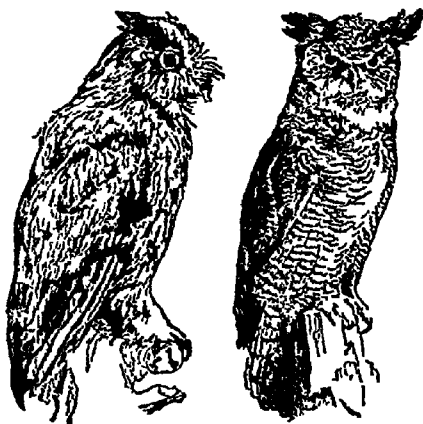
OWEN, ROBERT (1771-1858), an English social reformer, born in Wales. He was at the head of a company which bought large cotton mills at New Lanark in Wales, and the reforms which he introduced in the community made him famous throughout Europe. He believed in thorough cooperation and attempted several times to found communities based on this idea. In 1824 he visited America and founded a community at New Harmony, Ind., which, however, proved unsuccessful.

OWENSBORO, *o'enz bur o*, KY, the county seat of Daviess County, 112 miles southwest of Louisville, on the Ohio River, and on the Louisville & Nashville and the Illinois Central railroads. The airport is two miles east of the city. It has steamboat service to other river cities. The city is in a farming and stock-raising country, and contains valuable timber and deposits of oil, coal, clay, stone, and natural gas. It has about forty manufacturing establishments, including tobacco factories, flour and planing mills, packing-house products, castings, and structural steel works. There are two hospitals and a Carnegie Library, junior and senior high schools and a business college. There are seven parks. It was settled as Yellow Banks in 1798, was made the county seat in 1815 and was given its present name in honor of Colonel Abraham Owen, a local celebrity. In 1818. Population, 1920, 21,060, in 1930, 22,765.

OWEN SOUND, formerly **SYDENHAM**, ONT., the capital of Grey County, and a port of entry on Georgian Bay, situated at the mouth of the Sydenham River, 122 miles northwest of Toronto. It is on the Canadian Pacific and the Canadian National railroads. There is a well-protected harbor twelve miles long, and the city has regular steamship connection with other lake ports. In the vicinity is the largest mica mine in North America. Owen Sound has numerous manufactures producing a variety of commodities, and it owns and operates all public utilities. It is a well-known summer resort. Population, 1931, 12,839.

OWL, a small bird of prey, of which there are about 200 species. All have thick, short bodies, very strong wings, large heads and large eyes, usually surrounded by circles of radiating feathers, which, with the rather dignified movements of the birds, gave them an appearance of wisdom that is not wholly justified. The plumage is soft and downy, and their flight is almost noiseless. Their legs, and even their toes, are usually feathered, though in some species they are bare. The toes are so arranged that they can be used like hands for claspings.

Most owls work and feed at night, and their eyes are especially fitted to see in the darkness. During the day owls spend their time in crevices of rocks, nooks and



SCREECH OWL GREAT HORNED OWL

crannies of old buildings or hollows of trees, and in such positions they nest, laying from two to five white eggs. When disturbed or wounded, some of them fight fiercely.

Some Species of Owls. Several different species vary greatly in size and in habits. The *great horned owl*, common to North and South America, is usually brown in color, though it varies sometimes to almost white. When in search of prey it is so quiet and rapid in its movements that it is able to cause great destruction among small wild animals and even among domestic fowls. The tufted *screech owl* is probably the most common species in the Eastern United States. It is small, harmless and best known by its shrill, unpleasant cry. In the Western United States a little *burrowing owl*

lives in the home of prairie dogs, often in company with rattlesnakes, and it is supposed that the owls and snakes prey upon the young of the prairie dogs. The *snowy owls* are large and handsome birds, with pure white plumage. They hunt by day and are fearless in their attacks on birds as large as ducks and partridges. They are found in the cold regions of both hemispheres. The *long-eared owl* appears in the woods of both hemispheres, and the *short-eared owl*, living in more open places, is also found over a very wide territory.

The "little owl," most commonly mentioned in literature, is the one whose note is *to-whit, to-who*. This, too, is the bird sacred to Minerva and still regarded as the symbol of wisdom. In olden times, owls were considered birds of ill omen, and they are still regarded by some with superstition among uneducated people.

OWOS'SO, MICH., in Shiawassee County, twenty-six miles northeast of Lansing, on the Shiawassee River and on the Grand Trunk, the Michigan Central and the Ann Arbor railroads. There is a full-service airport. It is in an agricultural region and contains manufacturing of furniture, caskets, malleable iron, stoves, screens doors and windows, beet sugar, there are railroad shops. The city has a business college, a Carnegie Library, a Federal building, and 100 acres in parks. It was settled in 1836, and was chartered as a city in 1859. The commission form of government is in operation. Population in 1920, 12,575, in 1930, 14,496, a gain of 15 per cent.

OXALIC ACID, an acid which occurs, combined sometimes with potassium or sodium, at other times with calcium, in wood sorrel and other plants and in minute quantities in the fluids and tissues of the animal body. Many processes of oxidation of organic bodies produce this substance. Thus, sugar, starch and cellulose yield oxalic acid when fused with caustic potash or when treated with strong nitric acid. Oxalic acid is a solid substance which crystallizes in four-sided prisms, the sides of which are alternately broad and narrow, and the summits, two-sided. They are efflorescent in dry air, but attract a little humidity if it be damp. They are soluble in water, and their acidity is so great that, when they are dissolved in 3,600 times their weight of water, the solution reddens litmus paper and is acid to the taste.

Oxalic acid is used extensively in industry. It is a deadly poison, and its use by mistake for epsom salts (which it resembles) has had fatal results. Chalk milk and solutions of lime are antidotes. *Oxalates* are compounds of oxalic acid with bases; one of them binoxalate of potash is well known as salts of sorrel or salts of lemon. The oxalate of lime is an important agent in medicine.

OXFORD, ENGLAND, the home of a celebrated university, is a city and Parliamentary borough and the county seat of Oxfordshire. It is situated at the junction of the Thames (here called the Isis), and the Cherwell, fifty miles northwest of London. It is built on a low plain, surrounded by hills and extended by many beautiful suburban districts. High Street, which houses several of the colleges of the University of Oxford (which see), is one of the finest thoroughfares of all England. The oldest building is the castle keep, built in the time of William the Conqueror. Because of its many beautiful churches, notably Saint Mary's, Saint Michael's and Saint Peter's Oxford is also known as the *Cathedral City*.

Oxford is first mentioned in history in the tenth century although there is evidence that it was in existence somewhat earlier than this. During the Middle Ages it occupied a place of considerable importance. One of the famous occurrences in its history was the assembling, in 1258, of the Parliament which passed the Provisions of Oxford. The university was founded about the twelfth century. During the struggle of Charles I with Parliament Oxford was the center of the Royalist movement. Although the city was besieged by the army of Parliament, it was not bombarded, and its famous buildings thus escaped destruction. Population, 1933, 83,410. See OXFORD UNIVERSITY.

OXFORD MOVEMENT, an important movement in the Church of England, so called because it started in Oxford. It occurred in the first half of the nineteenth century, and represented an effort to restore to the English Church the spiritual glow and fervor that had animated it in the seventeenth century. Religious thought and life in England had become cold and mechanical a condition that alarmed some of the more spiritual of the clergy. In July, 1833, John Keble gave the movement definite form by preaching in Saint Mary's Church, Oxford, a sermon on *National Apostasy*. About the same

time friends of the cause began publishing a series of *Tracts for the Times*, which had wide influence. Of the clergymen whose active interest was enlisted, the most notable was John Henry Newman. After a time the Tractarians, as they came to be known, began differing among themselves, and a small body, including Newman, went over to the Roman Catholic Church. Newman's secession, in 1845, marks the close of the agitation as a definite movement, but its influence was by no means checked. It caused a revival of interest in religion, and the High Church movement of the present day is a direct result of it.

OXFORD UNIVERSITY, one of the most important universities in the world, and the oldest in England. It is located in Oxford, a beautiful old town on the Thames about fifty-five miles from London. Its history dates back to the twelfth century, but the present plan of organization originated about 1250. This great university is a union of more than a score of men's colleges, at the head of which are officials known as warden, provost, principal, president or master. There are also four halls at Oxford exclusively for women. Since 1920 women are permitted to take degrees on same basis as men. Among the more notable men's colleges are Balliol, Christ Church, Trinity, University, Magdalen and Exeter.

Certain students in each college are elected to fellowships after their graduation, and they then take a very important part in the college life, teaching, aiding in the school management and carrying on postgraduate studies. Undergraduates are directed by tutors, who maintain close personal relations with them. Class sessions are devoted to lectures instead of recitations and students are required to do an extensive amount of reading and to take examinations which are conducted by the university organization. There is a comprehensive system whereby superior students receive special honors. All degrees are based upon examinations. Athletic, debating and literary societies are an important feature of college life. Every undergraduate is expected to take an active part in athletics.

Oxford is of especial interest to American students because of the provision in the will of Cecil Rhodes, by virtue of which two students from every state are given support, to

the amount of \$1,500 a year each, for completing courses in the university. In normal years the student enrollment is about 4,800. Since 1920 women have been admitted.

OXIDATION, *ok si da'shun*. When elements or compounds combine in such a manner that there is a transfer of electrons (particles of negative electricity), from one to another, the process is called oxidation. The element or compound which loses the electrons is *oxidized* while the one which gains them is *reduced*. Those substances which can gain electrons in this way are termed *oxidizing agents*. When the oxidizing agent is oxygen, the resulting compound is an *oxide*. Oxides containing one, two or three atoms of oxygen are called monoxides, dioxides and trioxides respectively. Oxides are among the most important compounds of which chemistry treats. Ordinary combustion or burning is a process of oxidation by oxygen in which the substance is seemingly destroyed because of the escape of the oxides as gases and smoke.

OXYGEN, the gas that enables animals to live, plants to grow and fire to burn, is the most abundant of all substances. It forms by volume one-fifth of the air, by weight eight-ninths of water, combined with silicon and other substances it forms nearly half the earth's crust.

Oxygen is a gas, without color, odor or taste. It is a little heavier than air, and is slightly soluble in water, but the small quantity absorbed is of great importance, for without it fish could not live and the oxygen in running water helps keep it free from animal and vegetable matter. Oxygen combines with most other elements.

Experiments. Pure oxygen can be obtained by heating a mixture of black oxide of manganese and potassium chlorate in a flask and collecting the gas in jars inverted over water. Since the gas is heavier than air it will remain for a short time in a jar if the mouth is covered. Then the following experiments can be readily performed:

1. Attach a match to a wire. Light the match and place it in the oxygen. It will burn much more brilliantly than in air.
2. Place burning sulphur in a jar of oxygen and notice the brightness of the flame.
3. Dip the end of a wire or an old watch spring in sulphur. Light the sulphur and place the wire in a jar of oxygen, the wire will burn, throwing off brilliant sparks, and a slight coat of iron rust (oxide iron) will form on the inside of the jar.

Oxidation and Combustion. The slow combination of oxygen with other substances is called *oxidation*, and the products formed are *oxides*. The rusting of iron is a good illustration of oxidation. But when the union is so rapid as to be accompanied with light and heat, the process is called *combustion*, as in the burning of wood and coal. The same products are formed in each case and the same amount of heat is given off, only in case of oxidation the process is so slow that the heat is imperceptible. That is, as much heat will be produced in the rusting out of an iron wire as in burning it in a jar of oxygen, but the rusting may be extended over years, while the burning requires less than a minute.

How Oxygen Supports Life. Neither animals nor plants can live without air. In respiration a portion of the oxygen in the air that enters the lungs reaches the blood and purifies it. The purified blood then enters the arteries and circulates through the body, rebuilding the tissues. When the blood enters the lungs it is of a dark, purplish-red color, when it leaves them, purified by the oxygen, it is a bright red. Moreover, through the union of the oxygen with the tissues, or oxidation, the heat which maintains the temperature of the body is developed. One of the waste products formed during this process is carbon dioxide, which is given off through the lungs.

Plants, on the other hand, absorb carbon dioxide through their leaves and give off oxygen, but this process goes on only under direct sunlight.

Uses of Oxygen. Under great pressure oxygen is changed to a liquid, which is stored in strong steel cylinders for commercial uses. When mixed with hydrogen in proportion of two parts oxygen to one part hydrogen and burned in a tube with a small opening, it produces an intensely hot flame, and is used in blowpipes, producing a flame so hot that it easily cuts steel. Oxygen is used in acetylene welding, and in medicine to restore patients who are partially suffocated. It is also employed in severe cases of pneumonia. For commercial purposes it is obtained from liquid air.

History. Oxygen was discovered in 1774 by Priestley who named it *dephlogisticated air*, because he thought it did not possess the principle of phlogiston, in other words, because it would not burn. Another chemist, Scheele, rediscovered it and named it *oxygen*,

a name meaning *acid-former*, because he thought it was an ingredient of all acids

OXYGENATED, oks'i jen a ted, **WATER**.

See **OXYGEN DIOXIDE**

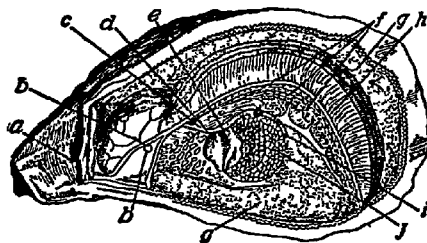
OXYHYDROGEN LIGHT. See **LIME LIGHT**

OYAMA, o yah'mah, Iwao, Prince (1842-1916), field marshal of the Japanese army. He was born in Satsuma, and during his youth had for a tutor Saigo Nanshu, a relative, one of the greatest military geniuses of Japan. In the Japanese war of restoration, in 1868, when the forces of the emperor fought against those of the Shogun for the restoration of the sovereign power to the emperor, Oyama fought under Saigo for the emperor, but in the civil war some ten years later, when Saigo, with other Satsuma men, revolted against the emperor, Oyama stayed with the imperial forces, and at the head of a division of troops he succeeded by brilliant skill and courage in bringing victory to the army of the emperor. His later positions were chief of police, associate minister of the interior, vice-minister of war and minister of war. In 1884 he was appointed chief of the general staff, and in the war between China and Japan he was in command of the second army. In the Russo-Japanese War, in which he served as chief of the Manchurian army, Oyama won distinction and gave evidence of great strategical and engineering genius. He received the British Order of Merit in 1906, and a year later was awarded the title of prince.

OYSTER, a salt-water mollusk, highly esteemed as an article of food. Of all classes of marine animals valued as fishery products, oysters are the most important. The oyster consists of a soft body enclosed in a rough shell of two valves, the under one being larger than the upper. Food is taken into the body through a funnel-shaped opening, or mouth, at the narrow end of the body, and is assimilated by a central stomach attached to the mouth by a tube. A fold of muscle known as a mantle lines the shell, the valves of which are held together by a strong muscle.

Oysters are propagated by eggs. These are so minute that they appear like a milky fluid in the water. The young oysters are for a time able to move about, but as they develop, they attach themselves to some hard, smooth object, where they remain during life. A number attach themselves to one another,

sometimes forming large masses, with distorted shells. The oyster is found in the Atlantic, off the coasts of America and Europe, in temperate latitudes. It prefers rather



ANATOMY OF THE OYSTER

- | | |
|---|--|
| a—Hinge | g—Mantle after passing through gills |
| b—Ganglia of the nervous system | h—Gills (arrows show direction of current produced by cilia) |
| c—Blood-vessel from gills to auricle of heart | i—Outline of organ of Bojanus, the so-called kidney |
| d—Ventricle | j—Adductor muscle |
| e—Auricle | |
| f—Pores from which water issues into bronchial canals | |

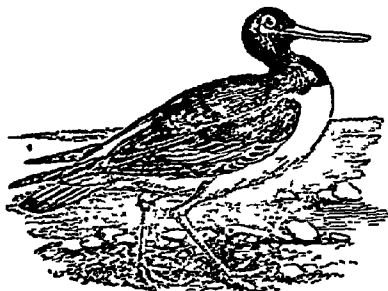
shallow water, with a smooth, sloping bed of gravel or mud, in a location where the tide washes in upon it the minute plant and animal organisms that constitute its food.

Because of their delicate flavor and nutritive qualities, oysters are highly valued as food. In the United States oyster fishing is an important industry on the Gulf Coast of Louisiana and Mississippi, in Chesapeake Bay, and at various other places along the Atlantic coast as far north as Maine. The natural beds have been nearly exhausted, and *oyster farming*, or oyster culture, is now a well-established occupation in many localities. A suitable place for a bed is selected and cleared of rubbish which would interfere with the growth of the oysters. The bottom is strewn with solid objects to provide anchorage for the young oysters. This is then marked by buoys and stocked with young, or "seed," oysters from other beds. The bed then requires little attention. Oysters attain their growth in about three years. They are usually obtained by dredging, dragging the bed with an iron rake that detaches the oysters from the bottom and collects them.

Oysters are placed on the market in the shell, in bulk and in cans. The canning is usually done near the place where the oysters are grown. Bulk oysters are taken from the shell immediately after they are drawn from the water and are shipped in pails containing ice. When shipped in the shell, the shells

are packed in boxes of ice, since the oyster must be kept cool or it soon loses its flavor.

OYSTER CATCHER, a long-legged wading bird having an extended, sharp-edged, wedge-pointed bill, which it uses for opening



OYSTER CATCHER

clams, oysters and other mollusks, on which it feeds. The bird is a strong flier and an expert diver. It builds no nest, but lays its eggs, which are buff, marked with brown, and usually three or four in number, on the ground. One species is found on both coasts of the American continents. It is about twenty inches long, has brown plumage above and white beneath, and black head and neck. The European species has handsomely variegated black and white plumage resembling that of a magpie.

OYSTER PLANT, or **SAL/SIFY**, a plant cultivated for its edible root, which has a flavor somewhat like that of oysters. The plant, a native of Europe, thrives in almost any temperate climate, and is much cultivated in the United States, though it has not

the commercial importance of either carrots or parsnips. The second season it produces flower stalks three or four feet high, capped with purplish blossoms. The tapering roots are from eight to twelve inches long and about two inches in diameter at the top. Like parsnips, the roots are better if left in the ground in winter.

OZAKA, *o sah'ka*. See **OSAKA**.

OZARK, *o'zahrk*, **MOUNTAINS**, a chain of hills occupying Southern Missouri, Northern Arkansas and parts of Oklahoma. These are among the oldest mountains in the world. They were once lofty, but have been worn away in course of the ages until now only separate peaks or domes are standing. The highest of these, about 2,000 feet, are the most southern, and are heavily wooded. The hills contain rich deposits of coal, lead and iron. South of the Arkansas River the elevation is known as the Ouachita Mountains.

OZONE, a colorless gas, with an odor resembling that of weak chlorine. It is a modified form of oxygen, in which three volumes of oxygen are condensed to two. Ozone exists in small quantities in pure country air and is produced in various ways. When an electric machine is set in operation or a lightning discharge occurs, the peculiar smell of ozone may be noticed. Ozone acts as a very powerful oxidizer, for this reason it is of great service in the atmosphere, as it renders comparatively harmless the dangerous and obnoxious products of animal or vegetable putrefaction. Ozone rapidly bleaches indigo, converting it into a white substance called isatin, which contains more oxygen than the indigo itself.



P, the sixteenth letter in the English alphabet, has varied considerable in form from its Phoenician original, the greatest change taking place in the transition from Greek to Latin, when the short perpendicular limb was bent around to join the longer. In all of these languages, however, it stood for the same sound, which it still retains in English. At the beginning of a few words, as *psalm*, and before *t* in a few words, as *receipt*, *p* is silent. It forms a part of one diagraph, *ph*, which has the same sound as *f*.

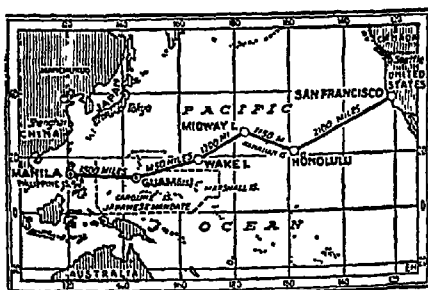
The most important use of *P* as an abbreviation is for the Latin *post*, in such expressions as P. M., afternoon, P. S., post-script.

PACIFIC OCEAN, the largest of all the "seven seas," that immense body of water which stretches from the two continents of North and South America on the east to Asia and Australia on the west. It has an area of 67,699,630 square miles, therefore is more than twice the size of the combined land masses of the four continents whose shores it reaches. This vast ocean was unknown to white men until 1513, when Balboa, its discoverer, saw it from the heights of Darien (Panama). Magellan, while sailing around the world (1519-1522) named it, choosing the word *Pacific*, because under the favorable circumstances of his voyage he found it quite peaceful. Its calmness is reflected only in its name, however, for the Pacific is as stormy as any other sea.

The greatest extent of this ocean, east to west, is about 10,000 miles at the equator, from north to south its length is about 7,350 miles. The average depth is nearly three miles; the greatest, so far as known, was found in 1927 to be 34,416 feet, west of Mindanao, an island of the Philippine group. There are several spots where depths exceeding 30,000 feet are recorded. The currents

of the Pacific are similar to those in the Atlantic, but are on a larger scale. The Japan Current, called by the Japanese Kuro Siwo, corresponds to the Atlantic Gulf Stream; it crosses the ocean and warms the shore of Canada and the northwestern coast of the United States; fog prevails in upper latitudes when warm air currents meet the cold. The American shore line is not deeply indented, the largest indentation is the Gulf of California. On the Asiatic shore are the partly enclosed China Sea, Yellow Sea, the Sea of Japan, and the Sea of Okhotsk, all large indentations.

Over the Ocean by Air. In 1924 six members of the United States Army Air Corps flew around the world, and for the first time airships were first seen over the North Pacific Ocean, but at no time were the aviators more than three hours from land, for they kept as close to the land masses as possible. The *Graf Zeppelin*, a lighter-than-air craft,



Courtesy of The New York Times

FUTURE AIR STATIONS IN THE PACIFIC

crossed the North Pacific; Post and Gatty, and later Post alone, followed the route marked by the army fliers Charles and Anne Landbergh flew the northern route to China, and Kingsford-Smith ventured over

the Pacific islands to America's shores. These were all pioneering and hazardous flights. Since then one regular route has been chartered by Americans across the mid-Pacific north of the equator, great China Clippers are to fly the route from California to Hawaii, Midway Island, Wake Island, Guam, and Manila. Japan is preparing for inauguration in 1938 a regular Zeppelin service from Tokyo to Vancouver and San Francisco. Three weeks by steamship to Asia will soon be reduced to an air voyage of about four days.

PADEREWSKI, *pah de ref'ski*, **IGNACE JAN** (1860-), a Polish musician who after gaining worldwide fame as a pianist abandoned his artistic career for that of a Polish patriot and statesman. During the World War he devoted his entire time to raising relief funds for his suffering countrymen, and when the defeat of the German alliance assured the rise of a redeemed Poland, he stood out as a leading figure in the new nation, becoming Premier and Foreign Minister of the provisional republic (see **POLAND**).



PADEREWSKI

Paderewski was born in Podolia, Russian Poland. He studied at Warsaw and at Berlin, was made a professor of music in the Warsaw Conservatory at the age of eighteen, and a few years later was offered a similar position in the Conservatory of Strassburg. Later he went to Berlin for further study, and afterwards became an advanced pupil under Leschetizky. In 1887 he made his formal debut in Vienna, and three years later created a name for himself in London by brilliant performances. His successes were repeated in America, where he received such ovations as had rarely, if ever, been accorded a pianist. In 1889 Paderewski married Baroness de Rosen. His several published compositions have not received the enthusiastic approval of critics, though some of his piano pieces are of a high order. His compositions include an opera, *Mauru*, a symphony, a concerto, a trio, a piano sonata, a sonata for piano and violin and a famous *Minuet*.

PAD'UA, *ITALY*, one of the most interesting cities of the kingdom, and capital of the province of the same name, is situated on the Bacchiglione River, twenty-two miles southwest of Venice, with which it is connected by rail. The river flows through the city in several branches and is crossed by numerous bridges. The houses are lofty, the streets narrow and crooked, and several of them, as well as some of the squares, are lined with medieval arcades. Within recent years the city has been much improved by the opening up of new streets and the widening of old ones. The university was long renowned as the center of law and medical instruction in Europe.

Under the Romans Padua was a flourishing town, and its history is similar to that of most of the cities of Italy after the decline and fall of the Roman Empire. Latterly it was under the rule of Venice, whose fortunes it shared until 1866, when with Venice it became part of the kingdom of Italy. At present the place has considerable manufacturing importance and a prosperous local trade. The city was the birthplace of the Roman historian Livy. Population, 1931, of city and suburbs, 131,066.

PADU'CAH, **KY**, the county seat of McCracken County, eighty miles southwest of Evansville, Ind., at the confluence of the Ohio and Tennessee rivers, on the Illinois Central, the Nashville, Chattanooga & Saint Louis and the Chicago, Burlington & Quincy railroads. The city is in an agricultural, lumbering and mining region and contains over fifty factories. The principal products are cotton rope, tobacco, veneering and other lumber products, wagons, pottery, flour and various other articles. It has railroad shops, and steamboats are also constructed. There are good shipping facilities, both by rail and water. A double-track bridge over the Ohio River contains a single span 720 feet long. At the time it was built, it was the longest span ever constructed. The place was settled in 1827, and was chartered as a city in 1856. The commission form of government was adopted in 1913. Population, 1920, 24,735, in 1930, 33,541, a gain of 35.6 per cent.

PAGANINI, *pah ga ne'ne*, **NICCOLO** (1784-1840), a celebrated violinist, perhaps the greatest master of violin technique the world has ever seen. He was born at Genoa, Italy, and had for teachers some of the foremost

masters of that city. He is said to have composed a sonata at the age of eight and the next year to have made his first public appearance in concert. When he had learned all the best teachers of the day had to give him, he began a rigorous course of self-training, often practicing fifteen hours a day. On his concert tours he played before audiences who fairly went wild with enthusiasm, some listeners declaring he performed feats of magic with the devil's aid.

Paganini has been criticised because of a side of his character which led him into unconventional situations. These departures from rigid standards were probably reactions from long periods of intense concentration on his art. Coarse pleasures often intrigued him, gambling cost him considerable sums. To a natural son, Achillino, he left his fortune of \$400,000. Paganini left a considerable number of compositions for stringed instruments, chiefly for the violin. The instrument on which he played, a very fine Guarneri, he bequeathed to the town of Genoa, where it is preserved in a museum.

PAGE, THOMAS NELSON (1853-1922), an American novelist and short-story writer, born at Oakland, Va. He was graduated from Washington and Lee University and from the University of Virginia Law School. After practicing law for eighteen years he moved to Washington, D. C., and thenceforth devoted himself to literature. Honorary degrees have been conferred on him by several universities, and he is a member of the American Academy of Arts and Letters. In 1913 he was appointed United States ambassador to Italy, and served conspicuously in this difficult post during the World War.



THOMAS NELSON
PAGE

His novels and stories deal almost exclusively with southern characters. The best-known of his novels are *Red Rock*, *Gordon Keith*, *John Marvel*, *Assistant*, *Bred in the Bone*, *The Land of the Spirit* and *The Stranger's Pew*. The volume *In Old Virginia* contains the incomparable stories, *Marse Chan*, *Meh Lady* and others. Page has written many essays and poems. In 1921 he published *Italy and The World War*.

PAGE, WALTER HINES (1855-1918), American journalist and diplomatist, born at Cary, North Carolina. He spent four years at Randolph-Macon College, and later two years at Johns Hopkins. He then engaged in newspaper work for twelve years, part of the time as a special writer, for a short time as editorial writer on the *New York World*, and later as editor of a paper of his own in Raleigh, N. C. In 1890 he became editor of *The Forum*, which he conducted for five years. He was then in turn literary adviser for Houghton Mifflin & Co., and editor of the *Atlantic Monthly*. In 1890 he became a member of the firm of Doubleday, Page & Company and one of the founders of the *World's Work*, which he edited for twelve years, when he resigned his position to become ambassador to Great Britain. In this position during the trying period of the World War, Page fully sustained the reputation of his country, and by his sound judgment and common sense greatly endeared himself to the British people. He resigned in October, 1918, because of ill health, and returned to the United States, where he died December 22. *The Life and Letters of Walter Hines Page* was published in 1922.

PAGEANT, *pa'jent*, or *pa'jent*, a term defining a dramatic representation of a number of scenes, either tableaux or miniature dramas. In Europe the pageant has been in vogue for centuries, but in America its popularity is of recent date. It affords excellent opportunity for giving vital instruction in history, art, literature, science and industry. Simple scenes representing single events can be given in almost any school or home with a little ingenuity on part of the teacher or mother. Inexpensive material will answer every purpose, and often much of the material needed will be found in the pupils' homes. The great value of the pageant in education lies in the fact that it appeals to instincts that are universal in humanity. All classes—children, youth and manhood—take delight in such representations, and are ready to lend their aid to any reasonable plans presented.

In its nature and methods it is much to be preferred to the plays, fairs and exhibitions often given. Pupils live in the scenes they are rendering or witnessing. Imagination is quickened. The process is constructive, not analytical, because the appeal is to all the faculties.

The following works are inexpensive and will be found helpful to those desiring to give pageants Bates and Orr's *Pageants and Pageantry*; Constance Darey Macey's *Costumes and Scenery for Amateurs*; Thorp and Kimball's *Patriotic Pageants of To-Day*

PAGODA, a towerlike building, common in India and the Far East, used by Buddhists for religious purposes. In India the pagoda is sometimes a pyramidal structure placed over the gateway or inner shrine of the temple; again it may be an independent building. The Hindu pagodas are among the most magnificent buildings in the world. In China pagodas are exceedingly numerous. There, too, they frequently are independent buildings—towers where sacred relics are kept. Commonly the Chinese pagoda is a many-sided building of numerous stories, with an encircling veranda at each story. The roofs of these verandas, and likewise the eave-like projections, are curved, and give to the building a distinctive contour. Most of these towers are of brick. The Japanese pagoda, commonly an adjunct of a temple, is built of wood on account of the frequent occurrence of earthquakes in Japan.

PAINE, THOMAS (1737-1809), a political and philosophical writer, born in England. In 1774 he emigrated to America and threw himself heart and soul into the cause of the colonists. His pamphlets entitled *Common Sense*, written to recommend the separation of the colonies from Great Britain, and *The Crisis*, published during the Revolutionary War, made him prominent. In 1787 he traveled in Europe and while there wrote, in answer to Burke's *Reflections upon the Revolution in France*, the *Rights of Man*, in which he attacked Burke and criticized the English Constitution. To escape the hostility this provoked, he went to France and was chosen a member of the French National Convention for the department of Calais. On the trial of Louis XVI he voted against the sentence of death. This offended the Jacobins, and toward the close of 1793 he was arrested and escaped the guillotine only by an accident. He remained in France till August, 1802, and then embarked for America where he spent the remainder of his life. Just before his confinement he had finished the first part of *Age of Reason*, a book ridiculing the religion that draws its inspiration from the Bible. This work, once widely read, no longer withstands scholarly criticism.

PAINT, a mixture of a coloring substance with a liquid—oil, glue or water, and used for protection and for ornamentation. That is, we paint our houses on the outside to protect them from the weather, and on the inside to make them more beautiful. The coloring matter in a paint is the *pigment*, and the fluid with which it is mixed is the vehicle. A *drier*, usually some compound of manganese, is often mixed with the other ingredients. If a paint mixed with oil is too thick it is readily thinned by the addition of a little turpentine. The essential qualities of a good paint are permanency of color and adherence to the surface to which it is applied.

Oil paints are those mixed in oil, *water colors* are paints having the coloring matter mixed in water, to which a small quantity of glue is added to make the paint adhesive. *Mineral paints* are those whose pigments are mineral substances, such as ochre and umber. *Metallic paints* contain a metallic base, such as white lead (which see) and zinc white. They are the most durable of all paints.

Luminous Paint Luminous paints contain a compound of phosphorus and are used for illuminating clock dials, street signs, buoys, and other objects that need to be seen at night. After being exposed for a time to light the paint will be luminous for many hours in the dark. Anyone can make luminous paint for use on paper by dissolving ten parts by weight of pure gelatin in forty parts of hot water and adding one part glycerin and thirty parts phosphorescent powder. A surface covered with this paint should be protected by varnish.



PAINTING, one of the three major arts of design, the others being sculpture and architecture. Painting is the art of representing on a flat surface, by means of color, objects in nature. The poet Browning, in his *Fra Lippo Lippi*, says

We're made so that we love

First when we see them painted, things we have passed

Perhaps a hundred times nor cared to see

And so they're better, painted—better to us,
Which is the same thing. Art was given for that.

None of the fine arts has done more to develop in man the love of beauty than has painting, which Ruskin called "a noble and expressive language."

Classification Considered in relation to the subjects treated, painting may be divided into decorative, historical, portrait, *genre*, representing scenes of common or domestic life; landscape, with seascape, architectural, and still life, in the last of which are represented inanimate groups, such as vases or fruits. According to the methods employed in the practice of the art, it is termed oil, water color, fresco, tempera or distemper, and enamel painting. Decorative works, usually in fresco or tempera, but sometimes in oil, are generally executed upon the walls, ceilings or other parts of a building. Up to the fourteenth century ordinary paintings in both oil and tempera were generally made on wood panels, prepared with a coating of size and white, and these are still sparingly employed, but tightly stretched canvas, covered with a priming of size and white lead, is now almost universally adopted as a surface for oil painting. For water colors, paper alone is employed.

Oil colors are colors ground with oil, and **water colors** are those wherein gum and glycerine have been used. Both are ground solid, oil being used in the first case and water in the second to thin out the colors when on the palette. Fresco painting is executed on wet plaster. In tempera the colors are mixed with white, in encaustic, wax is the medium employed, and in enamel the colors are fired. Egyptian, Greek and early Roman paintings were executed in tempera, Byzantine art found its chief expression in mosaics, though tempera panels were executed and early Christian art up to and partly including the fourteenth century adopted this last method. The substance employed in mixing the colors was a mixture of gum and white of egg, or the expressed juice of fig tree shoots. The introduction of oil painting was long attributed to the Van Eycks of Bruges (1380-1441), but painting in oil is known to have been practiced at a much earlier period, and it is now generally held that the invention of the Van Eycks was a drying substance with which to mix or thin their colors.

Ancient Period Painting first comes into historical notice in Egypt in the nineteenth century B. C., but the most flourishing period

was between 1400 B. C. and 525 B. C. With the Egyptians the art was the offspring of religion and was, with sculpture, from which it cannot be separated, subordinate to architecture. The paintings are found chiefly on the walls of tombs and temples, but they are also on mummy cases and rolls of papyrus. They consist chiefly of the representation of public events, sacrificial observances and the affairs of everyday life. No attempt was made to imitate nature, and the work was executed according to strict rules, under the supervision of the priesthood. The paintings were usually not flat, but in low relief or slightly sunk. The artists showed no knowledge of perspective, but produced natural and lifelike pictures. The colors used are very simple, but the effect is often harmonious and beautiful.

The Greeks had a pretty legend about the beginning of drawing and painting in their country. A girl whose lover was going away, and who was brokenhearted at losing him, saw his shadow cast upon a wall and drew a line about it, that she might have the semblance of him with her always.

Painting never grew to the importance in Greece that sculpture attained, but it assumed two characteristic forms, besides the painting of pictures. These were the decoration of vases and the coloring of statues. Great numbers of vases have been found, mostly in tombs, and these give us a very clear idea of what the vase painting was. Some of the figures on the earliest, crudest vases are simply outlines of men and of animals roughly drawn, showing little lifelikeness. Later the art grew, and some of the vases which are decorated with pictures representing stories from mythology are really exquisite.

It is only comparatively recently that it has been known that the Greeks used to color their statues. From most of the recovered sculpture the coloring has worn off, and thus the finders have always taken it for granted that white was the original color. It was not the common practice, apparently, to use a flesh color on the statues, though rare examples of that have been found, but the hair and lips and eyes and clothing were painted. Care was not always taken to make the colors lifelike; horses were sometimes made blue, and lions red.

We possess almost no fragments of Greek pictures but ancient writers have left assurance that the Greek painters were mas-

ters of form, composition, color, light and shade, and perspective. An old story, which is interesting even if not true, is told of a contest between Zeuxis and Parrhasius. The one who painted the most lifelike picture was to have a prize. When the judges had gathered, Zeuxis presented his painting—a beautiful bunch of grapes. So lifelike were they that the birds came and tried to eat them, and the judges exclaimed "Zeuxis has won! He has deceived the birds." But Parrhasius advanced to show his picture, which was apparently covered by a curtain. "Withdraw the veil," said Zeuxis, "that we may see the picture." But when he reached out to touch it, he found that the curtain was the picture, and the judges awarded the prize to Parrhasius, who had deceived even his competitor.

Rome never had in ancient times an art that was its own or produced a painter worthy of note. The conquest of Greece by the Romans brought an influx of Greek artists into Italy, and it was by their hands that the principal works of Roman art were produced. A number of specimens of ancient paintings, chiefly in fresco and mosaic, have been discovered in the tombs and baths of Rome, at Pompeii and at other places in Italy. During the first three centuries after Christ, painting under the new influence of Christianity was practiced secretly in the catacombs (see CATACOMBS). But with the establishment of Christianity, by Constantine, as the religion of the state, Christian art was permitted to emerge and was allowed to adorn its own churches in its own way. Later there were many limitations and rigid requirements which fettered the artists, and the result was that art declined, until, with the flood of barbarism which in the seventh century buried Italian civilization, the art of Christian Rome was practically extinguished.

Meanwhile, with the establishment at Byzantium of the Roman capital, in A. D. 330, a Byzantine school of art had been steadily growing. At Byzantium, art had become Christian sooner and more entirely than at Rome. Like the art of ancient Egypt, however, it had grown, under the strict influence of the priesthood, mechanical and conventional, but was yet strong enough to send artists and teachers through southern Europe. All the Byzantine decorations are in mosaic and are noteworthy for the splendor of their gilded backgrounds and for their grandeur of

conception, though the figure drawing is weak, with no attempt at pure beauty.

Development of Painting in Italy. In Italy the painters could not at once free themselves from the Byzantine tradition which compelled one painter to follow in the steps of his predecessor without referring to nature, and so this style was carried on in Italy by Byzantine artists and their Italian imitators up to the middle of the thirteenth century. The breaking through of this tradition and the great progress made by the arts in the thirteenth century, form the beginning of a movement which has been termed the Renaissance or Revival (see RENAISSANCE). Three cities of Italy, namely, Siena, Pisa and Florence, share the honors of this revival, each boasting a school, and each possesses two or three great names. The most important of these painters who showed a marked departure from the Byzantine manner was Giovanni Cimabue, who may be said to be the father of modern painting. Cimabue was the first to give individual life, grace and movement to figures. He made the draperies less rigid and showed a naturalism which was entirely lacking before his time.

The story goes that once as he was walking in the mountains, he saw sitting on the ground while his sheep rested around him a shepherd boy. The boy had in his hand a piece of slate, upon which he was scratching with a lump of coal. Cimabue, always interested in anything relating to drawing, approached and examined what the boy was doing, and found that he had drawn a lamb, very like those which lay about him. Much impressed, Cimabue begged for and obtained permission to take the boy to his studio and train him as his pupil. This shepherd boy was Giotto, the first great modern painter. He understood by no means all which painters who followed him regarded as the great principles of art, for instance, he knew little about perspective. But the people he painted looked like real people, with feelings and intelligence.

Filippo Lippi. It seems that each great painter added something which brought the art of painting nearer and nearer perfection. Thus Fra Filippo Lippi, though he by no means equaled some of his predecessors in composition, excelled in the treatment of single figures and in costumes. Whether he was painting saints or Madonnas he used as his models just the people he passed on the street every day, making no changes even in their costumes. His people are human and

strong, and when a picture is supposed to look like a loving mother it looks like one. Filippo Lippi was an interesting character. Left an orphan, he was taken to a convent and brought up there, and in 1421 he became a monk. He was never, however, a monk in anything but outward forms.

Botticelli. Filippo Lippi's most famous pupil was Botticelli, who possessed much of his master's vigor, with a tenderness and a daintiness that the older painter had not had. All of his pictures are a little sad, as if the artist were unable to associate perfect beauty with radiant happiness.

Leonardo da Vinci. One of the most extraordinary men who ever lived was Leonardo da Vinci, who was born in 1452. He was unusually handsome and graceful, strong and active, and so winning in his manner that everybody loved him. He loved all living things, and stories are told of how the birds used to perch on his shoulder without fear. Besides possessing all of these attractive characteristics, he had talents which would have made half a dozen men famous. He was one of the greatest painters that the world has ever seen, he was a sculptor, an engineer, an architect, a scientific investigator, an inventor. One of the things which strikes a person first about his paintings is that they look modern. Filippo Lippi's and Botticelli's pictures, beautiful as they are, look a little strange to our eyes, we need to familiarize ourselves with them before we see their beauties. But Leonardo's have nothing "old-fashioned" about them.

His most famous painting, considered by critics one of the twelve greatest paintings of the world, is the "Last Supper." This was painted on the wall of a church at Milan, and as the wall was plastered, and the material used was distemper, the wonderful picture scaled and faded until little of its beauty remained. Just of late, however, some very skilful work has been done toward restoring the picture, and if the scaling and fading can be prevented in the future the people will have a chance to see the masterpiece in something like its original beauty. Leonardo da Vinci spent four years in the production of this painting, and to everyone who knows it it has seemed unnecessary for any other painter, no matter how great, to attempt the same subject. Christ has just said to his disciples, "One of you shall betray me," and they have broken up into excited groups.

Another great picture of Leonardo's is the "Mona Lisa." This is a portrait of the wife of a Florentine man named Del Giocondo, and the picture, regarded as the greatest portrait ever painted, is often called "La Gioconda." The hands are very beautiful, and the face, while not beautiful has a wonderful, inscrutable smile, which makes it always mysterious and interesting. While painting the portrait, on which he worked at intervals for four years, Leonardo had music played, that the rapt expression might not fade from the face of the lady. The "Mona Lisa" was sold to Francis I of France for four thousand gold

florins, and is one of the chief glories of the Louvre.

Andrea del Sarto. Another interesting Italian artist was Andrea del Sarto, known as the "Faultless Painter." Browning has a wonderful poem, a dramatic monologue supposed to have been spoken by Andrea, in which we see what he himself regarded as the great failing of his art—the lack of soul.

Michelangelo. (1475-1564) Like Leonardo da Vinci Michelangelo was painter, sculptor, architect. He himself chose sculpture as his profession, and for a long time refused to consider himself a painter at all. But other people had more faith in his powers than he had himself, and Pope Julius II chose him to paint the ceiling of the Sistine Chapel in the Vatican. Michelangelo protested in vain—the pope would have his way. We may imagine the great man shut up in the Chapel with his problem—what theme was wonderful enough to use for such an undertaking? Finally he planned to represent the world from creation of man to the flood. At first he intended to have other painters work from his designs but they could not satisfy him, and at length he decided to do all the work himself. The ceiling paintings, of which the "Creation of Man" is regarded as the greatest, occupied him for about four years, and when we consider that in doing this work he was for the most part forced to lie on his back we can see what a tremendous task it was that the pope had set for him.

Later, the successor of Julius ordered Michelangelo to paint one more picture for the Sistine Chapel on the end wall by the altar. This picture, which took the artist almost eight years to complete, was the "Last Judgment," probably the most famous single painting in the world. It contains three hundred fourteen figures, which represent almost every conceivable physical attitude and expression and the various mental and moral states.

Correggio. (1494-1534) Correggio, if we may believe the reports, was in his way as remarkable as Leonardo or Michelangelo, and for this reason. They received the best of training in their art, and visited all the art centers, Correggio lived and died in a little town near Parma, and there is nothing to show that he ever visited any city but Parma or that he had any efficient teaching. Some authorities say that he probably never saw a great painting besides his own, but there is one interesting story which says that he once, after having long desired it, saw a picture of Raphael's. He studied it carefully, and then exclaimed, not boastfully but with intense conviction, "I too am a painter." There were some things which Correggio seemed to understand better than anyone who preceded or followed him, notably the treatment of light and shade, some people to-day criticize Correggio's pictures as being too sweet, and lacking in depth, but his "Night," with the darkness of the manger partly dispelled by the light which comes from the Christ-child, will always remain a favorite.

Raphael. (1483-1520) Raphael, unlike Leonardo and Michelangelo, was not a sculptor or an architect, but just a painter. But he was perhaps the most versatile painter that ever lived. He could paint a sacred scene for an altar piece of a church, a portrait, a study from classical mythology, or a historical scene all superbly, and yet each in so different a manner that even a critic could scarcely tell that they came from the same hand. Most famous of all his paintings is the "Sistine Madonna," the best known and best loved of all madonnas.

The same Pope who had engaged Michelangelo to decorate the Sistine Chapel decided to employ Raphael to redecorate a series of rooms in the Vatican. These had already been frescoed by great artists, but the pictures were destroyed and Raphael was given free hand. Over a window appears the "Delivery of St. Peter," a painting which in its treatment of light and shade rivals Correggio. But the two greatest paintings which the rooms contain are the "Disputa" which shows the Christian saints fascinated by a glorious vision of God, Christ, the Holy Spirit, and the great characters of scripture, and the "School of Athens." This latter painting represents an assembly of the great philosophers, poets and men of science of Greece. The remarkable thing is that Raphael, who was not a philosopher, should have been able to give this brilliant Grecian civilization such exact representation.

His great painting of the "Transfiguration," by some critics regarded as the greatest painting in the world, was unfinished at the artist's death. The upper group, Christ, Moses and Elias above the mount, and the middle group, Peter, James and John upon the mount, were completed but the lower group of the demoniac, his parents and the people was not finished. Raphael's body was laid out in his studio, by the side of his unfinished masterpiece, and all Rome flocked to the place to do honor to the "prince of painters."

Other Painters. Venice produced a school supreme in its use of color and Titian (1477-1576), chief of the Venetians, takes rank with the other great masters. Others of note who flourished in the sixteenth century were Palma Vecchio, who painted beautiful women with marvellous effect, Tintoretto, a master of color, and Paul Veronese, who was skilled in portraying banquet scenes.

Painting Elsewhere in Europe. In the Netherlands the fourteenth and fifteenth centuries produced the Van Eycks, a famous family of Flemish painters. Hans Memling (1430-1494) was another master of the Flemish school whose work shows a distinct advance in the progress of painting. In Germany the influence of the Flemish school made itself felt and produced in Albrecht Dürer of Nuremberg the most celebrated master of his time north of the Alps. Then

followed Hans Holbein the younger, the greatest painter Germany ever had, who excelled in pictorial effects and in use of detail, as well as in general effect. Lucas van Leyden stands as the most important painter of the early Dutch school.

Seventeenth Century. With the seventeenth century came a decline, brought about chiefly by the slavish imitation of the great painters of the preceding period. In Italy the art of Guido Reni, Albani and Domenichino, representatives of the Bolognese school, begun somewhat earlier by the Caracci, was excellent for its technical qualities, but it was entirely lacking in originality.

In Flanders Rubens became the greatest exponent of Italian art. His pictures are especially good for their strength and brilliant coloring. His chief pupil was Van Dyck, noted for his portraits. At this same time there arose also a noted class of *genre* painters, among whom was Teniers the younger. In Holland art had attained a distinct individuality in Franz Hals, and to a greater degree in Rembrandt, both portrait painters distinguished for their remarkable groups. Holland, too, is the great exponent of landscape painting, as shown in the work of such men as Van de Velde, Ruysdael and Cuyper, and of *genre* painting, in the naturalism of Gerard Dow and Van Ostade.

Painting in Spain which stands alone in the prevailing religious ascetic character of its productions, reached its greatest epoch in this century, with the realism and religious fervor of Velasquez and Murillo.

Italian influence was very marked in France in the seventeenth century. Nicholas Poussin, figure and landscape painter, was one of the greatest painters France can claim. Claude Lorraine and Casper Poussin are painters of landscape, who, though born in France, yet worked in Italy and stand apart from the followers of the national style, which was coeval with the court of Louis XIV and representative of it, the chief exponents being Le Brun and Mignard.

Eighteenth Century. In England the first native painter of note was William Hogarth, who turned directly to nature in his art. He was followed by Sir Joshua Reynolds and by Gainsborough, distinctly original. A school of water-colorists arose at this time, among whom Turner stands preëminent.

Nineteenth Century. In France, David, a painter whose influence made itself felt

throughout Europe, was the great reformer. He insisted upon a return to the study of the antique, and his followers number a few distinguished men, notably Gross and Guerin. Gérault, a pupil of Guerin, was the first to break with the extreme classicism of the school of David. Ingres, Delacroix and Delaroche, the last named noted for the reality of his historical subjects and for the tenderness and pathos of his sacred pictures, are the most distinguished names of the more direct and romantic style. Modern French landscape art, founded upon an impulse received from England, has had Decamps, Rousseau, Corot, Millet and Jules Breton as its chief exponents. The work of Regnault illustrates remarkably the tendencies of modern French painting. Bastien-Lepage with his literal renderings of nature, strongly influences the younger British school, and Meissonier, Gérôme, Bouguereau, Constans and Puvion de Chavannes, a decorative artist, are some of the chief members of a school which is at the present time influencing the art of the world.

Germany during the eighteenth century remained stationary in matters of art, but with the revival in France came a similar but slightly later movement in Germany. The chief of the revivalists was Overbeck, and following him came his pupil Cornelius, one of the greatest of modern German painters, whose work is best seen in Munich. Schnorr von Carolsfeld chose for his subjects the medieval history and myths of Germany and also produced an extensive series of illustrations of the Bible. Lessing is famous, both for his historic and landscape pictures. Gabriel Max and Menzel, in historic painting; Knaus, Vautier, Metzler and Bochmann, in *genre*; and Achenbach, in landscape, are worthy of note.

Among the best known later artists in Great Britain are John Constable, Rossetti, Burne-Jones, William Morris, Leighton, Watts, Millais, Landseer and Alma-Tadema. In Russia painting remained at a standstill long after the Byzantine period, but since 1850 it has made great advances. It has produced Swedomsky, historical painter; Verestchagin, a traveler artist, and Kramskoy, a religious painter.

Until about 1825 the United States had followed Great Britain in art, as in literature. Since that time, however, a marked development of individuality and excellence has been apparent. At the French exhibi-

tion, the most famous and exclusive of art exhibitions, there was in 1855 no American section; in 1868 a part of a small section was allotted to the United States, in 1878 it had a large exhibit, and in 1900 it furnished the largest exhibit except France and received more honors than any other nation except France. Most American painters complete their education abroad, usually in France; but there is an increasing number of good art schools in the United States, and with the excellent instruction offered in the public schools, they are rapidly cultivating an appreciation of the best in art. Of nineteenth-century American painters the following are among the best known: West, Copley, Stuart, Allston, Bierstadt, Church, Inness, La Farge, Sargent, Vedder, Whistler and Moran. A more comprehensive knowledge of painting may be obtained by reading the biographical articles on the different painters.

Twelve Great Paintings. The artist- critic W. W. Story has given the following as the twelve greatest paintings in the world:

- The Transfiguration, Raphael, 1509, in the Vatican
- Sistine Madonna, Raphael, 1518, Dresden Gallery. See illustration, article RAPHAEL.
- Last Judgment, Michelangelo, 1534-1541, Sistine Chapel
- Communion of Saint Jerome, Domenichino, 1614, Vatican
- Descent from the Cross, Rubens, 1612, Antwerp Cathedral
- Descent from the Cross, Volterra, about 1545, Church of S. S. Trinita de' Monti, Rome
- Last Supper, Da Vinci, 1498, Santa Maria delle Grazie, Milan
- Assumption of the Virgin, Titian, 1518, Venetian Academy
- The Night, Correggio, 1522, Dresden Gallery
- Aurora, Guido Reni, 1609, Rospigliosi Palace, Rome
- Beatrice Cenci, Guido Reni, 1609, Barberini Palace
- Immaculate Conception, Murillo, 1678, Louvre

Picture Study. Picture study serves as a delightful recreation in school, provided the study is so presented that it appeals to the children. To be successful the teacher should heed the following suggestions:

- 1 Choose simple pictures of subjects which the children can understand and which appeal to their own experiences.
- 2 Remember that pictures representing action are of greater interest to children than those which represent repose.
- 3 The picture should be large enough to enable the objects represented to be easily seen.



THE MELON EATERS

Murillo had the great artist's gift of being able to see and to express the rare charm and beauty in ordinary people and commonplace happenings



THE GLEANERS (Above)



THE ANGELUS (Below)

4 The pictures should possess artistic merit as to both color and form. Cheap colored paintings and pictures poorly drawn should be avoided.

5 If possible, give the children the opportunity to live with the picture several days before beginning the study.

6 When the picture is first placed before the children give a brief description of it.

7. During the study call attention to and ask questions about only those features which the children can understand and enjoy.

8 Do not attempt a complete analysis.

9 Do not moralize. If the picture has a moral the children will find it.

10 Give a brief and interesting sketch of the artist, calling attention to at least one or two of his other works.

The "Melon Eaters." This is the picture of some street urchins who lived in the city of Seville, Spain, a long time ago. From their surroundings we should judge they had gone into the country for vegetables, and when returning had loitered by the way. Their clothing indicates that they are from poor families, but the expressions on their faces show them to be contented and happy.

Notice the attitude of the boy about to eat the piece of melon. How eagerly his gaze is fixed upon it! The expression of the other boy indicates that he is enjoying the sport as much as his companion. Possibly the first boy is about to attempt to swallow his piece of melon on a wager. At all events, the second boy is so interested in what his companion is doing that he has delayed eating his own share.

The dog is likewise interested in the sport. See how eagerly he is watching his master, and his wistful expression indicates that he also would like to share in the feast.

Notice the perfect proportions and the natural pose of the figures. The details of the vegetables in the foreground and the shrub at the right combine to preserve the balance of the picture. All these features prove that this picture is the work of a great artist. We cannot study it without seeing in our imagination the young man Murillo wandering about the streets and market places of his native city and making careful study of its child life—life which he portrayed with such vividness and strength.

This picture is of interest to children, especially to boys of the age of those of this reproduction. Its reality to life, the action expressed, and the composition all appeal to the child. Moreover, this is a work of the greatest Spanish painter. These conditions make it especially suitable for school use.

Questions. How many boys in the picture? Are they brothers? Why do you think so?

Which boy owns the dog? Why do you think so?

Where do you think these boys have been?

Where are they going?

What objects in the picture lead you to form this opinion?

Where are the boys seated?

What are they doing?

Are they having a good time? Why do you think so?

What is the dog doing?

What do you think he wants?

What do you like in the picture? Why?

Have you seen any other pictures by this artist? Can you name them?

The Artist. For biographical sketch, see the article on Murillo in these volumes. The following additional facts should be used to lend interest to the study. Others can be added if time and opportunity permit.

When a young lad Murillo was accustomed to decorate with his sketches whatever objects came in his way.

Murillo's parents were poor, but they clearly recognized the artistic talent which their son showed at an early age, and placed him under the care of his uncle, who was a printer and a draughtsman, and under whom he obtained his early training.

Murillo early learned to paint pictures of the children frequenting the street and market places of the city of Seville, showing their many grotesque sports and pranks. The picture used in this study is one of these sketches.

When Murillo was twenty-two his uncle removed to Cadiz. Murillo remained in Seville and supported himself for a time by painting inexpensive pictures for the public fairs. Though hastily executed, some of these pictures reveal the strength and skill of the artist to a remarkable degree.

Murillo merited and won the love of Seville and his home became the resort of artists and lovers of art.

Murillo's most famous paintings are on religious subjects. One of these, the "Immaculate Conception," was sold in 1852 for over \$120,000, the highest price that had been paid for a painting up to that time.

Murillo is described as a pious, patient, brave man. He worked incessantly, sold his paintings for a high price and acquired a large fortune.

The Gleaners and the Angelus. The two pictures shown here are among the world's famous paintings. The first one, "The Gleaners," shows a part of a harvest field on what is, apparently, a large farm. In the background are farm buildings, haystacks, a wagon, and figures of workers, in the foreground, three peasant women, in simple peasant costume, are bending down to pick something from the ground. What is there in that to make a picture beautiful and famous?

That is the very question which some people asked when the artist, Jean Francois Millet began to produce his pictures of peasant life. Classic pictures of the Greek gods, portraits of high-born gentlemen and ladies in gorgeous raiment, idealized shepherdesses with snowy flocks—these they could understand and appreciate but there was nothing lovely in peasant life. As Millet continued to produce his paintings, however, the critics began to realize that there was something about them

which they had not grasped at first, and that was a perfect sympathy with peasant life, which made the paintings not so much pictures as glimpses of real life

Now how did it happen that a great artist had so perfect a sympathy with the lowest class of the French people? A little study of his life will show us that Millet was himself of peasant family, and spent his boyhood working in his father's fields. Although it is possible that no one noticed the difference, the boy must have been different from the other boys about him, he saw things which they never saw, things which he was afterward able to put on canvas and thereby enable other people to see them. And very early he found that there was something besides working in the fields in which to interest himself. In an old Bible which was almost the only book in the peasant's hut in which they lived there were some old engravings which stirred his ambition, and he began to spend all of his leisure hours—and they were none too many—in drawing. His father, unlike many peasant fathers, did not discourage his son in an attempt to be something which his father had not been, but took some of his drawings to a painter in Cherbourg and asked him to accept the boy as a pupil. The artist at once recognized the boy's talents, and promised to receive him in his studio, but in a very short time the older Millet died, and the oldest son, then twenty-one years of age, returned to the field and took up his father's work.

Circumstances afterward became a little better, so that the young man was able to go to Cherbourg, and later to Paris to study. At the very first he did not confine himself to the subjects which later won him fame,

his art enough so that he was no longer really poor.

Now we can see why Millet was able to paint with such sympathy and exactness his three gleaners. These women are not workers in the harvest-field, their "gleaning" does not mean helping to get in the bounteous harvest. From the earliest times there has existed in certain countries a sort of unwritten law which declares that after the harvesters have gathered in the grain the poor peasants may come into the fields and pick up for their own use what is left. The Book of Ruth, in the Bible, is chiefly built around this custom, and we find many references to it throughout history.

The lower picture, "The Angelus" may mean even more to us than "The Gleaners." This, too, deals with an old custom, which still prevails in some Catholic countries. At morning, noon and evening the church bells are rung to remind people to stop in their work and say a prayer. This prayer is a brief one beginning "The Angel of the Lord," and is called the Angelus, from the Latin word for angel. In the picture, the bell is just sounding from the church spire far in the distance, and the two peasants at work in the field have stopped their work and bowed their heads to pray. A soft, evening light fills the picture, and we can tell from the attitude of the peasants that it is no mere formal prayer which they are repeating. The atmosphere of reverence is over the entire picture. These two paintings of the great peasant artist of France well repay study.

Study of "Aurora." The following study of "Aurora," by Guido Reni, can be made to serve two purposes. It may help to instill a love of



AURORA

but painted "The Golden Age," "Oedipus Unbound," and other classical pictures. Recognition of his great genius was very slow, and he suffered the most extreme poverty, but we are glad to know that before he died he knew that his work was appreciated, and gained by

pictures in the minds of the children, and it may be of great assistance in teaching language or composition work.

First, if possible, let each child have a copy of the picture in his own hands that he may study it carefully. Second, let each child tell,

ANCIENT

EGYPT

1. First historical notice in the thirteenth century B. C.
2. The most flourishing period, between 1800 and 525 B. C.
3. The art of embalming of religion.
4. Paintings found mainly on the walls of tombs and temples, mummy cases, rolls of papyrus.
5. Representative of public events, sacrifices and ordinary affairs.
6. Under supervision of priests.
7. No knowledge of perspective.

GREECE

1. Painting and sculpture subordinate to architecture
2. Its birth about 600 B. C., by Cimon of Cleone
3. Polygnotus, 480 B. C., the founder of historic painting of Troy, and visits of Odysseus to Ithaca
4. Apelles, the most celebrated of Grecian painters. Contemporary with Alexander

ROME

1. No Roman painter worthy of note
2. Specimens in fresco and mosaic in tombs and baths of Rome and at Pompeii.
3. Under the influence of Christianity for three centuries

PAINTING

England

1. Hogarth, the first native painter of note
2. Turned directly to nature
3. Reynolds and Gainsborough, distinctly original.
4. Turner pre-eminent in a school of water-colourists.
5. Turner's pre-eminent in a school of water-colourists.
6. First known later artist: Constable, Rossetti, Morris, Leighton, Watts, Landseer, Alma Tadema.

France

1. David, the great reformer. The return to the study of the antique. Gros and Guérin his pupils.
2. Delacroix, Delacroix. The most distinguished names of romantic style
3. Ingres, Delacroix, Delacroix. The most distinguished names of romantic style
4. Experts of modern French landscape art: Decamps, Rousseau, Corot, Millet.
5. Painters inheriting art of the present: finest: Signac, Lapon, Matisse, Matisse, Bouguereau, Constant, Offener.

MODERN

MEDIEVAL AND RENAISSANCE

Germany

1. Remained stationary during eighteenth century
2. Overbeck. Chief of the revivalists.
3. Cornelius. One of the greatest of modern German painters.
4. Schorn pre-eminent in a school of water-colourists.
5. Leutzing, Alton, Menzel, Vautier, Meissner

Russia

1. His made great advance since 1850.
2. Swendinsky, historical painter
3. Verestchagin, a travel artist.

United States

1. Followed Great Britain in art and literature until 1825.
2. In 1900 it furnished the largest exhibit except France
3. The best known painters: West, Stuart, Allston, La Farge, Sargent, Veder, Whistler, Manet

1 Giovanni Cimabue, called the father of modern painting. The first to give individual life, grace and movement to figures.

2 The Florentine School.

- a. The most decorative of all Italian painting.
- b. The work of the Van Eycks, Hans Memling.
- c. Verrocchio, the master of Leonardo da Vinci, and Ghirlandajo, the master of Michelangelo.
- d. Leonardo da Vinci, head of the Florentine School of the sixteenth century

- a. Michelangelo, architect, sculptor, painter
- f. Fra Bartolommeo and Andrea del Sarto, the best colorists of the school.
- 3 The Venetian School
- a. Aeneas under the influence of Giovanni Bellini.
- b. The school became supreme in its use of color
- c. Titian, chief of Venetians, ranks with the masters of the other schools

- 4 Umbrian School. Characterized by intense religious sentiment.
- 5 The Roman School.
- a. A continuation of the Umbrian.
- b. Centers about the great Raphael, the prince of painters
- c. Correggio, head of the Lombard School, united for grace, harmony, light and shade
6. Correggio, head of the Lombard School, united for grace, harmony, light and shade
- 7 The Renaissance in Germany
- a. Dürer. One of the first to excel in etching and the most celebrated master north of the Alps.
- b. Hans Holbein, one of the greatest of German painters. Excelled in pictorial effects

8. In the Netherlands
- a. Lucas van Leyden. The most important painter of the early Dutch School.
- b. Rubens, the greatest exponent of Italian art in Flanders. Van Dyck, his chief pupil.
- c. Rembrandt, the most famous of the Dutch painters.
9. In Spain.
- a. Velasquez, chief of the early Spanish painters.
- b. Murillo, the most important Spanish painter of religious subjects.

TWELVE GREAT PAINTINGS

- 1 The Transfiguration—Raphael, 1519
- 2 St. John Madonna—Raphael, 1518
- 3 Last Judgment—Michelangelo, 1534-1541
- 4 Communion of Saint Jerome—Domenichino, 1614
- 5 Descent from the Cross—Rubens, 1612
- 6 Descent from the Cross—Volterra, 1645
- 7 Last Supper—Da Vinci, 1498.
- 8 Assumption of the Virgin—Titian, 1518.
- 9 Immaculate Conception—Murillo, 1678.
- 10 Aurora—Guido Reni, 1609
- 11 Beatrice Cenci—Guido Reni, 1609
- 12 The Night—Correggio, 1522

SUGGESTED FOR BLACKBOARD OUTLINE

Questions on Painting

What is oil painting? Water color? Fresco? Encaustic? How produced?

How and on what were the early paintings of the Egyptians, Greeks and Romans executed?

How many centuries before Christ was painting practiced in Egypt? Was the art closely related to religion? In what relation was it held to sculpture and architecture?

Was any attempt made by the Egyptian artists to imitate nature?

Of what great historic value are these early Egyptian paintings? Give three reasons for your answer

By whom were the principal works of Roman art produced?

Describe the conditions of Roman painting for the first three centuries after Christ

What were the Catacombs? How were they built? Decorated? Protected? Inhabited?

By what art in the Catacombs did the early Christians indicate their religious devotion?

In what did Filippo Lippi excel? What poet has written about him?

Who was Botticelli? Andrea del Sarto?

When did art in the United States take on an individuality of its own?

What are the strikingly distinguishing marks between American art of 1855 and 1900?

Name five well-known American painters, with a great painting from each. For what was Whistler noted?

What are the twelve greatest paintings in the world, by whom, where found, and when produced?

What discovery of the Van Eycks produced a revolution in the art of painting?

By what process are mosaics made? What are the only examples of pure Grecian painting?

Characterize painting in Spain in the seventeenth century.

Name three great painters of France, of England and of Germany

Who was the most important painter of the early Dutch school?

as fully as possible, what he sees. Then the following series of questions will help to bring out the points of the picture. Some of the questions the children can answer themselves from their observation, but a number of them the teacher will have to answer for them.

1 What is the name of the picture? "Aurora"

2 Why is it so named? "Aurora" means "Dawn," and this is a picture of the dawn of the morning

3 What is Aurora in the picture? The draped figure that is leading

4 Who was Aurora? The Greeks believed that she was the goddess of the morning, who went ahead of Apollo, the sun god, scattering flowers in his way and opening for him the doors of the morning

5 Who is riding in the golden chariot? Apollo, god of the sun

6 How many horses are hitched to the chariot? Four (If the children cannot discover four horses let them count the noses)

7 Has Apollo any other attendants besides Aurora, in this picture? Yes there is Lucifer, the torch-bearer, called son of the morning, and the graceful figures of the Hours

8 Which way is Aurora looking? At Apollo, to see whether he is ready to have her open wide the gates of morning

9 Are they travelling on the earth? No, on the clouds. You can see the earth below

10 Are they traveling slowly or rapidly? Why do you think so? (Call attention to the horses' manes, and other signs of action)

11 Which is the most beautiful face in the picture?

Is there any one in the picture who has nothing to do?

12 By whom was this picture painted? Guido Reni. He was born at Bologna in 1575 and died in 1642. His father, who was himself a musician, hoped that his son would be a musician also, and the boy studied music for some time. He finally made up his mind, however, that he would never be happy unless he became a painter, so his father allowed him to have an artist's training. He painted many other pictures, some of them very beautiful, but this is the best known of all his paintings

13 Where is the original painting? On the ceiling of a palace at Rome (Explain that when these beautiful paintings are on the ceiling, looking glasses are placed below them, so that people can see them more easily)

14 Have you any question that you would like to ask about the picture?

Now let each child give a description of the picture, or let the whole class compose the description orally and then allow each child to write it out. Studies similar to this may be made of any picture

Related Articles. Consult the following titles for additional information

NOTABLE PAINTERS

Abbey, Edwin A.	Bartolommeo, Fra
Allston, Washington	Bastien-Lepage, Jules
Alma-Tadema,	Bellini, Giovanni
Lawrence	Bierstadt, Albert
Angelico, Fra	Blanchard, Edwin H.
Apelles	Bonheur, Rosa

Botticelli, Sandro
 Boughton, George H.
 Brangwyn, Frank
 Breton, Jules A.
 Burne-Jones, Edward
 Caravaggio, Michel-
 angelo
 Carracci
 Copley, John S.
 Corot, Jean B C
 Correggio
 Crane, Walter
 Domenichino
 Dorr, Paul Gustave
 Dürer, Albrecht
 Eyck, Hubert Van and
 Jan Van
 Gainsborough, Thomas
 Geïse, Claude
 Gerome, Jean Leon
 Giorgione
 Giotto
 Guido Reni
 Hals, Frans
 Herrera, Francisco
 Hobbema, Meindert
 Hogarth, William
 Holbein Han (Elder
 and Younger)
 Hunt, William Morris
 Inness, George
 Israëls, Josef
 Kaulbach, Wilhelm
 von
 La Farge, John
 Landseer, Edwin H.
 Sir
 Leighton, Frederick,
 Lord
 Leutze, Emanuel
 Lippi, Filippo
 Meissonier, Jean L. E.
 Memling, Hans
 Michelangelo

GENERAL ARTICLES

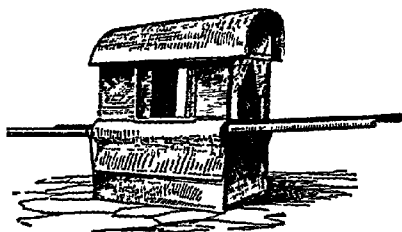
Angelus
 Barbizon Painters
 Cartoon
 China Painting
 Corcoran Art Gallery
 Cubist School of
 Painting
 Foreshortening
 Fresco
 Holy Family
 Impressionist School
 of Painting

Millaïs, John Everet,
 Sir
 Millet, Jean François
 Munkacsy, Mihaly
 Murillo, Bartolomé
 Estéban
 Parrish, Maxfield
 Peale, Charles Wilson
 Peale, Rembrandt
 Perugino, Pietro
 Vannucci
 Raphael Santi
 Rembrandt
 Remington, Frederic
 Reynolds, Joshua, Sir
 Rossotti, Gabriel
 Rubens, Peter Paul
 Ruysdaal, Jacob Van
 Sargent, John Singer
 Sario, Andrea del
 Steen, Jan
 Stuart, Gilbert
 Teniers, David
 Titian
 Tissot, James Joseph
 Jacques
 Titian
 Turner, Joseph M W
 Van Dyck, Anthony
 Velasquez, Don Diego
 Verestchagin, Vasilii
 Veronese, Paul
 Vinci, Leonardo da
 Watteau, Jean Antoine
 Watts, George
 Frederick
 West, Benjamin
 Whistler, James A.
 McN
 Wilkie, David, Sir
 Zeuxis
 Zorn, Anders

roads have made other means of conveyance more practicable and desirable

PAL'ATE, the name applied to the roof of the mouth. It consists of two portions, the *hard* palate in front, the *soft* palate behind. The former is bounded above by the palatal bones, is lined by mucous membrane and is continuous behind with the soft palate. It supports the tongue in eating, speaking and swallowing. The soft palate is a movable fold, suspended from the border of the hard palate in the back of the mouth. It consists of mucous membranes, nerves and muscles and forms a sort of partition between the mouth and the openings from the nostrils. Its lower border is free and from the middle of it hangs the *uvula*, on each side are two curved folds of mucous membrane, called the *arches*, or *pillars*, of the soft palate. Between these on each side of the pharynx are the two glandular bodies known as *tonsils*. The soft palate comes into action in swallowing and is of great importance in the utterance of certain sounds. The special use of the uvula is not well known. It is often relaxed or enlarged, causing a troublesome cough. Glands, secreting the mucus which lubricates the throat during the passage of food, are abundant in the soft palate. See **TONSILS**.

PALATINATE (German *Pfalz*), the name of two German states, distinguished as the Upper Palatinate and the Lower, or Rhenish, Palatinate. The former was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower Palatinate, or Palatinate proper, lay on both sides of the Rhine and included the towns of Heidelberg and Mannheim. The counts Palatine were in possession of the Palatinate and the districts



PALANQUIN

PAKENHAM, EDWARD MICHAEL, Sir (1778-1815), an English soldier, born in Ireland. He entered the army and became major general in 1812, served in the Peninsular War under the Duke of Wellington, winning distinction for his gallantry and success as a leader, and commanded the British expedition against New Orleans in 1814. He was killed in battle at New Orleans January 8, 1815. See **NEW ORLEANS, BATTLE OF**.
PALANQUIN, *pal an leen'*, a covered conveyance, used in India, China and other countries of the East. It is a sort of box, about eight feet long, four feet wide and four feet high, having windows fitted with wooden shutters and a seat for one person. It is borne by poles on the shoulders of two men. The palanquin is not now extensively used, because in India and other countries where it was formerly employed by Europeans, the building of railways and the improvement of

belonging to it as early as the eleventh century, and they were long among the most powerful princes of the German Empire. By

the Peace of Westphalia in 1648 the Lower Palatinate was separated from the Upper, Bavaria receiving the latter, while the former became a separate electorate of the Empire and was henceforth generally known as The Palatinate. By the treaties of Paris, 1814 and 1815, the Palatinate was split up, Bavaria received the largest part, the remainder being divided among Hesse-Darmstadt, Baden and Prussia.

PALEONTOLOGY, the science which treats of life that existed upon the earth before the age of man. Paleontology includes the study of fossils of both plants and animals. It is closely related to anatomy, botany and geology, and is one of the sciences upon which comparative anatomy is founded. The study of fossils according to the principles of paleontology is comparative, and it has enabled geologists to determine the relative advantages of the different rock formations and to divide geologic time into the periods and systems as they are now generally accepted. See **GEOLOGY**, **FOSSIL**.

PALEOZOIC ERA, that division of geologic time extending from the Protozoic to the Mesozoic Era and including the Cambrian, Ordovician, Silurian, Devonian and Carboniferous periods, each of which is described in these volumes. The time covered by the Paleozoic Era was exceedingly long, as shown by the great thickness of the combined rock formations and the development of life from the protozoa to the vertebrates. See **GEOLOGY**, **MESOZOIC ERA**, and articles on the periods and systems named above.

PALERMO, a seaport, the capital of Sicily, on the north side of the island, on the Bay of Palermo. The city is ornamented with numerous fountains and has many notable buildings, among which are a cathedral of the twelfth century, the churches of San Salvatore, San Domenico and San Giovanni degli Eremiti, a royal palace, a picture gallery, an armory, an archiepiscopal palace and a customhouse. The city is the seat of a university which has about 1,600 students, and is the center of all government activity on the island.

Palermo was probably founded by the Phoenicians, and it afterwards became the capital of the Carthaginian possessions in Sicily. It was taken by the Romans in 254 B. C. The Saracens held it for a time, and in 1072 it fell to the Normans. The German emperors and the French subsequently held it,

and from the time of the Sicilian Vespers it shared the fortunes of the Sicilian kingdom. Garibaldi captured the town in 1860. Population, 1931, 389,699.



Square in Bethlehem

PALESTINE, *pal'es tine*, or **THE HOLY LAND**, a small country on the eastern shore of the Mediterranean Sea, southwest of the republic of Syria, famous as the scene of Christ's ministry. Revered alike by Christians and by Jews, Palestine during the four centuries following 1516 was a possession of the Mohammedan Turks. In the last year of the World War, 1917-1918, Palestine was reclaimed from the Crescent by British forces. This triumph and the collapse of the Germanic alliance freed Palestine from Turkish rule. It remained under military control until 1920, and was then placed under mandate to Great Britain. The Jewish population organized a local government, to represent them in their relations with the British, and the Mohammedan population (in the majority) also appointed spokesmen. The Jewish hope of establishing here a new Jewish nation (see **ZIONIST MOVEMENT**) is not likely to meet with complete success because of natural hostility of Arab to Jew.

Palestine was early known as Canaan and Philistia. In the time of the patriarchs it was occupied by a number of independent tribes, but in the eleventh century B. C. it was united by Saul into a kingdom, which passed successively to David and Solomon. In the tenth century the kingdom was cut in two—Israel, in the north; Judah, in the south. The former fell before Assyria in 722 B. C., and the latter was conquered by Babylonians in 586 B. C. In the time of Christ, Palestine was held by Rome and was divided into four provinces, known as Galilee, Samaria, Judea and Peraea. In the seventh century A. D. it fell into the hands of the Mohammedans, whose brutal treatment of the Christians was one of the causes of the Crusades. In 1516 Palestine became a part of the Turkish Empire.

Modern Palestine. The life of the people has not greatly changed throughout the centuries. The shepherds still watch their

flocks upon the slopes, the native farmer still tills the soil with primitive implements, though new arrivals introduce modern machinery. The country is divided by a continuous water system, the Jordan River and three lakes—the waters of Merom, the Sea of Galilee and the Dead Sea. West of the river a chain of hills extends north and south, east of it, in the north, are the mountains of Lebanon, the highest of which, Mount Hermon, snow-capped in winter, is 9,000 feet high. The southwestern part is the most fertile, and there, on the slopes of the Judean hills, are raised olives, figs, apricots, grapes and grain. Across the river to the east the country is for the most part barren.

The climate is not unhealthful, but monotonous. The summer season is dry and hot, the winter rainy. The vegetation includes both temperate and sub-tropical plants—oaks, sycamores, ashes and cedars among the forest trees, and almonds, azaleas, narcissus, crocuses and anemones among the flowering herbs and shrubs. Population, 1931, 1,035,820, of whom 770,000 were Moslems, 175,000 Jews (1936), 95,000 Christians.

Related Articles. Consult the following titles for additional information:

Beersheba	Hebron	Lebanon
Bethany	Jericho	Mountains of
Bethlehem	Jerusalem	Nazareth
Canaanites	Jesus Christ	Nebo, Mount
Crusades	Dead Sea	Olives, Mount of
Dead Sea	Galilee	Samaria
Galilee	Jordan	Syria
Gethsemane	Judea	World War

PALESTINE, TEXAS, the county seat of Anderson County, 100 miles southeast of Dallas, on the Southern Pacific and the Missouri Pacific railroads. There is an airport. The city is in an agricultural and fruit-growing country. It contains railroad offices and shops, cotton factories and an ice plant, and has a considerable trade in cotton, grain, fruit, and vegetables. There is a Y M C A, a Carnegie Library, a convent, a city hall and three hospitals. The place was settled in 1846 and was incorporated in 1870. The mayor-council form of government is in operation. The city is near the great oil and gas region. Population, 1920, 11,039, in 1930, 11,445, (Federal census).

PALESTEINA, *pal es tre'nah*, GIOVANNI PIERLUIGI DA (1524-1594), one of the greatest of musical composers, was born at Palestrina, near Rome. Pope Julius III, formerly a fellow townsman, made him music director of Saint Peter's. On the death of Julius he became organist successively of the

churches of Saint John Lateran and Santa Maria Maggiore. When in 1564 there arose a need for reform in Church music, Palestrina composed a mass which brought him appointment to the highest position possible for a composer in the Church of Rome. A great celebration in his honor was held in Rome in 1575. The works of Palestrina, especially the masses, have been a model for subsequent sacred music. His style was the culmination of the simple and unemotional music of his day and the noblest manifestation of the austere and majestic forms suited to express deep religious sentiment.

PALISADES, *pal'saydz'*, a beautiful series of nearly perpendicular rocky cliffs which extend along the western bank of the Hudson River from Haverstraw, N. Y., to Weehawken, N. J., a distance of nearly thirty miles. The Palisades rise abruptly from the water's edge to heights ranging from 200 to 500 feet and add much to the scenic loveliness of this part of the Hudson. Palisades Interstate Park, 35,000 acres, extends north, along the west bank of the Hudson River and a short distance inland, from Dyckman Street Ferry to Bear Mountain Park, a distance of about 40 miles. The total cost was about \$8,000,000, borne by the two states. The park is managed by a board of commissioners who permit camping, picnics and any other proper use of the grounds.

PALLADIUM, a metallic element found by Wollaston in 1803. It is a ductile metal of a bright silvery luster, having a general resemblance to platinum, but harder, lighter and more easily oxidized. It occurs in platinum ores, in the nickel and copper ores of Ontario and in the gold-bearing sands of Brazil. As an alloy it is used in the manufacture of scientific instruments and in making the movements and springs of clocks. Because of its hardness it is used as a coating for silvered ware and to some extent in dentistry.

PALLADIUM, originally, any statue of a protecting deity of a city. The term is specifically applied to a statue of Minerva, said to have fallen from heaven, and which was preserved at Troy. The belief of the Trojans was that as long as the palladium remained in their city they could not be conquered. Diomedes and Ulysses succeeded in carrying it off, and many legends are told as to its fate. The Romans professed to believe that the Trojan Palladium had been

brought by Aeneas to Italy, but several Greek cities also claimed it

PALLAS ATHENE See MINERVA.

PALM, *palm*, a large family of plants, interesting because of their variety and beauty, but chiefly because of their great value to man. There are about 1,200 species, most of them native to the tropics. Of these some are vines, slender as reeds and several hundred feet long; others are low, bushy plants with leaf stems springing directly from the ground, still others are trees with trunks from three to five feet in diameter and reaching a height of a hundred feet. This last is by far the largest group.

The palms are divided into two great classes—those having pinnate or fern-shaped leaves, such as the *cocoanut palm* and *date palm*, and those with fan-shaped foliage, such as the *palmetto palm* of the southeastern states, the *Washington palm* of the North American desert and the *Palmyra palm* of Southern Asia. The peculiarity of most palms is the tall, branchless trunk, with its cluster of foliage, and in some species also fruit at the tip. As the trunk pushes upward in its growth and produces new foliage the old dies, and throughout its length its surface bears the scars and, in the case of some varieties, the dry, dead stumps of fallen leaves. The *doum palm* of Arabia is the only important species bearing branches.

With the exception of grass, there is no plant in the whole vegetable kingdom so important economically as the palm. It has been put to a thousand or more uses. It has been made to supply the three fundamental necessities of man—food, shelter and clothing. The fruit of many palms constitutes important food in many regions. Important among these are the date and cocoanut palms; the *bacaba palm* of Brazil, which produce clusters of berries yielding a valuable drink and an oil, and the *sago palm*, the trunk of which yields a starchy meal called *sago*. The trunks of some species of palms

are converted into excellent lumber, suitable for houses, ships and other structures. The long stems of certain varieties are used for wicker furniture. The leaves of most of them are extensively used in the tropics as thatch for dwellings. The fibers of many palms are fine and strong and can be woven into cloth.

Among the other innumerable products of this group of plants are oil, from the oil palm, used for lubricating and illumination, vegetable ivory from the seed of the *ivory palm*, and wax, which exudes from the trunk of the *wax palm*. The spines which grow upon the trunks of certain species are used as needles and fishhooks. Mats, baskets, rope, twine, ship sails, rugs, screens, bedding, candles, wine, honey, resin and hammocks are a few of the articles made from palms. In desert regions where other vegetation is scarce the palm is regarded almost with veneration by the traveler, who finds refreshment in its shade and fruit.

Related Articles. Consult the following titles for additional information

Betel	Palmetto
Cocoanut	Palm Oil
Date	Palmyra Palm
Doum Palm	Sago
Ivory Palm	



FAN PALM

PALMA, TOMAS ESTRADA (about 1836-1908), a Cuban general and patriot, first president of Cuba. He was born of wealthy Cuban parents and was educated in Spain. He fought with the Cuban revolutionists in the war of 1868-1878 and rose to the rank of general. He was elected president of the Cuban provisional government, but was captured by Spain and imprisoned. On his release he went to Honduras, and became postmaster-general of that republic. Later he removed to the United States and opened a school at Central Valley, N. Y. At the outbreak of the Cuban revolt of 1895 he closed his school and became one of its active supporters. On gaining their independence in 1901 the Cubans elected Palma as President, and four years later he was re-elected. President Palma was a man of good intentions but allowed himself to be dominated by politicians, whose unscrupulous practices ultimately led to his resignation.

PALM BEACH, FLA., one of the winter playgrounds of the United States, a village on the southeast coast of Florida, with a permanent population of 1,000 and a winter influx of about 5,000. It is on the Florida & East Coast Railroad, 300 miles south of

Jacksonville Some of the largest resort hotels in the country are here

West Palm Beach, the county seat of Palm Beach County, is on the west shore of Lake Worth, opposite the more famous village The latter town is also attaining prestige as a winter resort Population, 1920, 8,659, in 1930, 26,610

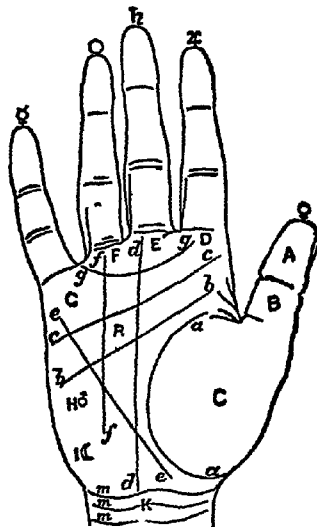
PALMERSTON, *palm'ur stun*, HENRY JOHN TEMPLE, third Viscount (1784-1865), a British Prime Minister He was educated at Harrow and in the universities of Edinburgh and Cambridge, and succeeded to his father's title in 1802 When only twenty-three he entered Parliament Two years later he became Secretary of War and held the office until 1823 Except for a brief interval he was Secretary of State for Foreign Affairs from 1830 to 1841 In the latter year he went out of office with the Whigs, but with their return to power five years later he resumed the duties of the Foreign Office Because of his open though unofficial approval of Louis Napoleon's act in declaring himself emperor of France, Palmerston was dismissed from the Cabinet in 1851, but returned with the new Ministry the following year, taking office as Home Secretary In 1854, when the Earl of Aberdeen's administration proved unable to cope with the Crimean situation, Palmerston was called to the position of Prime Minister by the unanimous voice of the nation, and his vigorous foreign policy brought the war to a termination After the defeat of the conspiracy bill in 1858 Palmerston resigned, but returned to the premiership the following year and remained in the office the rest of his life.

Palmerston's personal charm brought him unbounded popularity throughout England, but his reputation was even greater abroad than at home He made his influence felt in every part of the world, and his forceful foreign policy maintained for Great Britain through some of the most serious international complications in its history the respect of every other nation

PALMETTO, *pal met'o*, a North American palm found in the coast states from North Carolina to Florida The plants of one species grow to be about forty feet high, and each is topped by a cluster of large fanlike leaves having an expanse of from one to five feet The wood is very porous but exceedingly durable, and is much used in the construction of wharves. A dwarf species,

called *cabbage palm*, is stemless, the cluster of fanlike leaves growing out from the ground This palm is represented on the coat of arms of South Carolina, which is sometimes called the *Palmetto State* Another dwarf species is the *saw palmetto*, which produces berries having a certain medicinal property Palmetto leaves are much used in making hats, fans, baskets and in certain districts to thatch native huts

PALMISTRY, *palm'is trī*, or **CHIRO-MANOY**, *kī'ro man'sī*, is the so-called art of "reading the palm"—the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of



PALMISTRY

A, will, B, logic, C, mount of Venus, D, mount of Jupiter, E, mount of Saturn, F, mount of Apollo, G, mount of Mercury, H, mount of Mars, I, mount of the Moon, K, the rascette, a, a, line of life, b, b, line of head, c, c, line of heart, d, d, line of Saturn, or fate, e, e, line of liver, or health, f, f, line of Apollo, or fortune, g, g, the girdle of Venus, R, the quadrangle, m, m, m, the bracelets of life

the *palm* of his hand and of the lines traced upon it As an art, palmistry appears to be of great antiquity It has an ancient literature of its own in India and was to some extent, at least, known to the ancient Greeks To-day it has many believers, even though its theories have been frequently disproved This article states the facts relating to palmistry as practiced

Of the cultivation of palmistry among the Romans there is little evidence; but in the second century Artemidorus of Ephesus, the author of a work on the interpretation of dreams, is said to have devoted a whole treatise to the subject, which, however, is not extant.

The writers of the Middle Ages made frequent reference to the subject, and an important work was printed at Augsburg in 1475 by Johann Hartlieb. In the sixteenth century there were several treatises on the subject; in the end of the eighteenth century a celebrated palmist foretold the downfall of Napoleon; in recent times two Frenchmen, D'Arpentigny and Desbarrolles, have become the leading authorities, and it is on their works that modern English books on the subject are chiefly founded. The observation of the fingers and joints of the hand is quite as important to the chiromant as that of the palm itself. The thumb is generally regarded as the most important part of the hand. The first, or upper, phalanx of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power (see accompanying diagram for explanations through the remainder of the article). In studying palmistry the *mounts* of the hand, with the marks on them, and the lines in the palm are considered. The mounts are the elevations at the base of the fingers and thumb and in the side of the palm which extends from the root of the little finger to the wrist. The mounts are seven in number and are named from the planets, by the signs of which they are also known, namely, ♀ for Venus, ♃ for Jupiter, ♄ for Saturn, ☿ for Apollo, ☿ for Mercury, ♂ for Mars, ☾ the Moon. When well developed, the mounts indicate the possession of the quality associated with the respective planets—for instance, Jupiter denotes pride and ambition, Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs.

There are four principal lines—namely, the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette, or the bracelets. The bracelets if well marked strengthen the effect of the line

of life, each bracelet indicating thirty years of life. The line of heart, if long, clear cut and well colored denotes an affectionate and devoted character, and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury. A good line of head—that is, a clear-cut, long, unbroken line—indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding headline shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn, or fate; the line of Apollo; the line of liver, or health, and the line of Venus. A long, clear-cut line of Saturn foretells a happy and prosperous life, while breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; the Venus line, when present, indicates a character very liable to be influenced by the passion of love. Such marks on the mounts or lines as stars and crosses have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

PALM, palm, OIL, an oil obtained from the fruit of the oil palm, a native of the west coast of Africa. This tree grows to the height of thirty feet, bears a tuft of large pinnate leaves and has a thick stem, covered with the stumps of the dead leaves. The fruits, which are borne in dense clusters, are about one and one-half inches long by one inch in diameter, and the oil is obtained from their pulp. The oil is of an orange-yellow color, and when chilled hardens and looks like butter, for which it is sometimes substituted. Like butter, it soon becomes rancid. It is extensively employed in the manufacture of soap and candles and for lubricating machinery.

PALM SUNDAY, the last Sunday of Lent, the Sunday which immediately precedes Easter, so called from the custom of using palm branches in the religious exercises on that day commemorating Christ's triumphal entry into Jerusalem. Palm Sunday was first celebrated in the fourth cen-

tury, at Jerusalem, with a dramatic procession in which a Christian bishop, acting the part of Christ, rode into the city on an ass, accompanied by crowds waving palm branches. Later, in the Western Church the day was celebrated with a solemn mass, and the custom arose of blessing the palms to be carried in procession. The consecrated palms were taken home by the people and treasured.

PALMYRA, one of the ancient cities of Syria, situated in an oasis in the Syrian desert, 120 miles northeast of Damascus. According to tradition, it was founded or enlarged by Solomon and is believed to be the Tadmor mentioned in the Bible. In the third century, A. D., when Zenobia was queen of Palmyra, the city was destroyed by the Romans. It was rebuilt, then was again destroyed by the Saracens. It was partly restored, but gradually declined, and in the fifteenth century was plundered by Tartars. The modern town has a population of about 1,500 Arabs, who live wretchedly in a few squalid huts. Only the ruins of an ancient temple of Baal and a few other fragments stand to show that a populous and thriving city once flourished there.

PALMYRA PALM, a palm topped by a magnificent cluster of fan-shaped leaves, common in India, the Malay Archipelago and tropical West Africa. The trunk grows to be from twenty to seventy feet high and the leaves attain a length of about four feet, and have about seventy-five rays. This is one of the most valuable palms, its various parts being used in nearly 800 different ways. In parts of India the natives depend almost entirely on this tree to supply all their wants. When the plant is young it is eaten as a vegetable, the fruit of the older trees also is edible. The trunks are used for building, the leaf stalks for making fences. From the leaves are made hats, baskets, mats, fans and thatched roofs. The fibers go into twine and rope.

PALO ALTO, *pah'lo ah'lo*, BATTLE OF, the first important battle of the Mexican War, fought May 8, 1846, at the village of Palo Alto, eight miles northeast of Brownsville, Texas. The American force of about 2,300 was commanded by General Taylor, while the Mexican force of 6,000 was commanded by General Arista. The Americans were victorious after an all-day contest, chiefly with the artillery. Arista retreated

to Resaca de la Palma, where he was again defeated a few days later. See MEXICAN WAR.

PALO ALTO, CALIF., settled in 1891, is in Santa Clara County, thirty miles southeast of San Francisco, on the Southern Pacific Railroad. There is an airport. The town is famed as the location of Leland Stanford Junior University (which see). Most of the town's activity centers around this great school. There is a Carnegie Library, the Hoover War Library, a hospital, and a Veterans' hospital. Population, 1920, 5,900, in 1930, 13,652.

PALPITATION OF THE HEART, a distressing ailment in which the characteristic symptom is a rapid beating of the heart. Shortness of breath and a choking sensation are other symptoms. Palpitation may indicate a number of disorders, including heart disease, goiter and indigestion, it is sometimes brought on by shock, epileptic seizures and other nervous attacks. If it is chronic or unusually severe in its manifestations a physician should be consulted. An ice pack placed on the heart is sometimes an effective measure of relief.

PAMIR, *pah meer'*, the highest plateau in the world, occupying the region of Central Asia where four mountain systems unite—the Himalayas, Hindu Kush, Tian Shan and Kuen-lun. The tableland has an area of about 36,000 square miles and a general elevation of more than 13,000 feet, and from it rise lofty, snow-capped summits. The plateau is for the most part barren, but in the valley of the River Oxus, which rises here, and in the oases made by lakes, there is good pasturage for cattle. The country is unendurably cold in winter and hot in summer. Notwithstanding its hostile climate, two trade routes have crossed it for ages. The Persians call this region "the roof of the world," and they believe the white race originated there.

PAMLICO SOUND, a shallow lagoon on the southeastern coast of North Carolina. It is about eighty miles long and from eight to twenty-five miles wide, and is separated from the ocean by long, narrow, sandy islands. Pamlico is connected with Albemarle Sound by the Croatan Sound. It is separated from the Atlantic by a series of long, narrow beaches and is connected with it by three navigable inlets. At the extreme eastern point of this beach is Cape Hatteras.

The sound receives the waters of the Neuse and Pamlico rivers and contains valuable oyster beds

PAMPAS, the name usually applied to the great plains of South America, but especially to the grass-covered plains of Argentina. During the rainy season, these plains are covered with vegetation, and they provide pasturage for large herds of cattle and sheep. The name is a Spanish word meaning *plain*.

PAN, the chief woodland divinity in Greek classical mythology. As the god of flocks and herds, he was originally represented as an old man with two horns, pointed ears, a goat's beard, a goat's tail and hoofs. He was believed to be the son of Mercury and to have been named by the gods. The worship of Pan was well established, particularly in Arcadia. Pan invented the syrinx, or pandean pipes.

PANAMA, *pah na mah'*, the capital and chief city of the republic of Panama, on the south coast of the isthmus, on Panama Bay. As the harbor is shallow, trade is carried on chiefly through the terminal port of Balboa, constructed by the United States. Panama was founded in 1519, but its importance dates from the completion of the Panama Railroad in 1855, of which the city is the Pacific terminus. Up to 1904 the inhabitants were almost entirely supported by the inter-oceanic commerce over the railroad, but since the latter date canal operations by the United States government have contributed many additional advantages (see **PANAMA CANAL**).

Formerly the climate was considered very unhealthful for all except natives, and because of the lack of proper sanitary conditions the inhabitants suffered greatly from fevers and malaria. In 1904 the United States government took possession of the Panama Canal Zone, of which the city is geographically a part. By treaty between the United States and the republic of Panama, the former installed systems of waterworks and drainage and was given full authority in matters of sanitation in the city, but with no other jurisdiction within its limits. The Sanitary Corps of the United States army has made Panama a healthful place of residence.

Panama has a large cathedral, several convents, Jesuit college, the national university, the national theater, a government palace and a municipal building. All government buildings are modern. Two miles inland are the largest hotel on the isthmus and also the gen-

eral hospitals for canal operatives. There is a fairly extensive commerce, the imports being four times the value of the exports, the former include cotton goods, coal, flour, silk and rice; the latter, bananas, rubber, ivory nuts, gold and hides. Population, 1930, 82,827.

PANAMA, ISTHMUS OF, the strip of land which connects North and South America. Its general direction is east and west. It is also called the Isthmus of Darien. At its narrowest point it is only thirty-one miles wide. See **PANAMA, REPUBLIC OF, PANAMA CANAL**.



PANAMA, REPUBLIC OF, a small country occupying nearly all of the narrow isthmus joining North and South America. At the beginning of the year 1903 it was a province of Colombia, a republic in the extreme northwestern part of South America. In November of that year it declared its independence because of the refusal of the Colombian Senate to ratify a treaty with the United States providing for the excavation of a waterway across the isthmus. This action on the part of Panama made possible the construction of the great Panama Canal, the most remarkable engineering feat of modern times. The country of Panama extends nearly east and west between Colombia and the Central American state of Costa Rica. The Caribbean Sea, an arm of the Atlantic, bounds it on the north, and the Pacific Ocean washes its southern coast. It is about 480 miles long and from 31 to 118 miles wide. The area, 32,380 square miles, is nearly equal to that of the state of Maine.

Physical Features The surface over most of the country consists of hills and low mountains whose slopes are densely covered with trees. There is no regular arrangement of ranges, except in the west near the boundary line. Here the mountains are grouped into systems. The western part, too, is diversified by several lofty volcanoes long since burnt out. The largest drainage basin, between the Colombian boundary and the Gulf of Panama, is that of the Tuyra River, which empties into the Pacific. The central part is drained by the Bayano; west of this stream

is the Chagres, flowing into the Caribbean Sea. The waters of the Chagres contribute part of the supply used by the locks of the canal.

Panama has a tropical climate and the two seasons characteristic of countries in the torrid zone—the rainy and the dry. Jungle swamps, where disease-carrying mosquitoes breed in countless numbers, occur, but sections under the influence of the United States have been rendered healthful through sanitary reforms (see PANAMA CANAL, subhead *Sanitation*).

Production and Industry Only about three-eighths of the country is occupied, and of this area but a small proportion is properly cultivated. The United Fruit Company has about 35,000 acres devoted to banana raising, this being the most important cultivated product. Other products include raw rubber, coffee, cacao, coconuts, sugar, tobacco and various dyestuffs and medicinal products. Cattle are reared for export, and in the Gulf of Panama there are valuable pearl fisheries. Panama possesses nearly every common mineral except coal, but the mines are still undeveloped. After the country was made more healthful by American engineers during canal building, the native population in largely increased numbers turned to agriculture for a livelihood.

In the republic there are about 200 miles of railroads, including the Panama Railroad, which is nearly fifty miles in length and is owned by the United States. Routes by air for both mail and passengers are maintained, they reach all parts of Central America and extend to North and South America.

People and Cities In 1930 the population was reported as 467,459. The most numerous element is the mestizo, or mixed race, a people of Spanish, Indian and negro blood. There are, besides, native whites, people of Spanish descent, Indians, descendants of the original inhabitants of the country, blacks, the descendants of African slaves, Chinese and West Indians, and European and American immigrants. Panama, on the Pacific coast, is the capital city and metropolis, the city next in size is Colon, on the Atlantic coast. These ports are the terminals of the canal, but except for purposes of sanitary regulations, neither is included in the Canal Zone, over which the United States has jurisdiction. There are a number of small ports on both oceans.

Government The constitution, adopted in 1904, and amended in 1917 and 1928, provides for a national assembly of one chamber. Its members, called Deputies, are elected by popular vote for four-year terms, there being one member for every 15,000 inhabitants. Meetings are held biennially. The President of the republic must be thirty-five years of age, is chosen by popular vote for four years and is not eligible to reelection for the succeeding term. He appoints his Cabinet members, and also names five supreme court judges. Governors of the eight provinces were formerly appointed by the President, but since 1920 have been elected by popular vote. There are three Vice-Presidents, chosen by the national assembly.

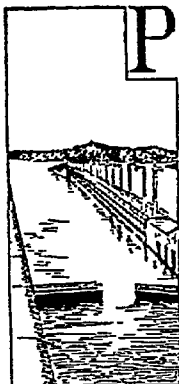
Education and Religion. The government maintains public schools throughout the eight provinces. These are attended by about 22,000 children. A number of young people are also educated at government expense in Europe and the United States. There are about a dozen private institutions, and a national university was opened in 1911 in Panama City. Roman Catholicism is the prevailing religion, but in the Canal Zone Protestantism is the stronger.

History The Caribbean coast of Panama was explored in 1502 by Columbus, and in 1513 Balboa saw the Pacific Ocean from a "peak in Darien." Darien was the old name for Panama. In the early colonial period the isthmus was a commercial highway of no mean importance, and was prized by Spain for that reason. When, in 1821, Spanish rule came to an end, Panama united with Colombia, but ten years later, on the breaking up of the latter, it joined the republic of New Granada. In 1885 Panama again became a part of Colombia, but the union was never satisfactory. From 1846 to 1903 there were over fifty revolutionary outbreaks on the isthmus, and in the latter year the dissatisfied province broke away from the home government. The United States recognized the new republic, and a treaty was immediately negotiated for the construction of the long-awaited waterway. The Canal Zone, ten miles wide, is under perpetual lease to the United States, at an annual rental of \$250,000.

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Balboa
Colombia
Colon

Panama (City)
Panama Canal



PANAMA CANAL, an artificial waterway across the Isthmus of Panama from Colon, on the Caribbean Sea, to Panama, on the Pacific Ocean. Its completion in 1914 marked the fulfillment of a project that had stirred the ambitions and imagination of mankind for about four centuries, and it represents one more link in the great chain of communication that is year by year welding the

nations closer together and making the world one great neighborhood

Early History of the Isthmian Project

The first desire for an isthmian canal was aroused by the Spanish conquest of Peru and Chile. At that time Ferdinand, king of Spain, proposed to cut a canal through the Isthmus of Panama, and his successor, Philip, thought favorably of a route across Nicaragua, but on account of European complications nothing was done for years.

The United States government first became interested in the isthmian canal project in 1825, when its representative to Nicaragua secured concessions for the construction of such a canal, and the following year Henry Clay, who was Secretary of State, ordered an examination of the route, but the matter was dropped soon after. Three years later, the king of Holland obtained a franchise for the construction of the canal, but this plan was annulled the following year, and nothing further of importance was done until 1847, when Great Britain obtained control of the proposed route. Great Britain's claim was disputed by the governments of Nicaragua and the United States, and no steps were taken to push the work. In 1849 Cornelius Vanderbilt formed a company which secured concessions from Nicaragua for the construction of a canal. In the meantime the discovery of gold in California increased the demand for such a waterway, and the Vanderbilt company began operations.

After spending about two millions of dollars, however, they found that the project was beyond their ability and attempted to secure the aid of the United States government. This aid was refused and the project fell through.

Beginnings of the Canal. The history of the Panama Canal proper dates from 1878, though some years previous to this, George M. Totten, chief engineer of the Panama Railroad, made a tentative survey for a canal, following the line of the railroad, and showed the feasibility of its construction, estimating the cost at from \$60,000,000 to \$150,000,000. His report was followed by a government survey, under the direction of Commander E. P. Lull of the United States navy. This survey resulted in locating the canal practically on the present route. In 1878 a concession was given Lieutenant Weyse and others by the government of Colombia to construct and maintain a canal across the isthmus. In the year following, a congress of 135 engineers was called at Paris, under the direction of Ferdinand De Lesseps, the builder of the Suez Canal. After a thorough discussion of the various routes proposed, the congress voted unanimously in favor of the Panama route.

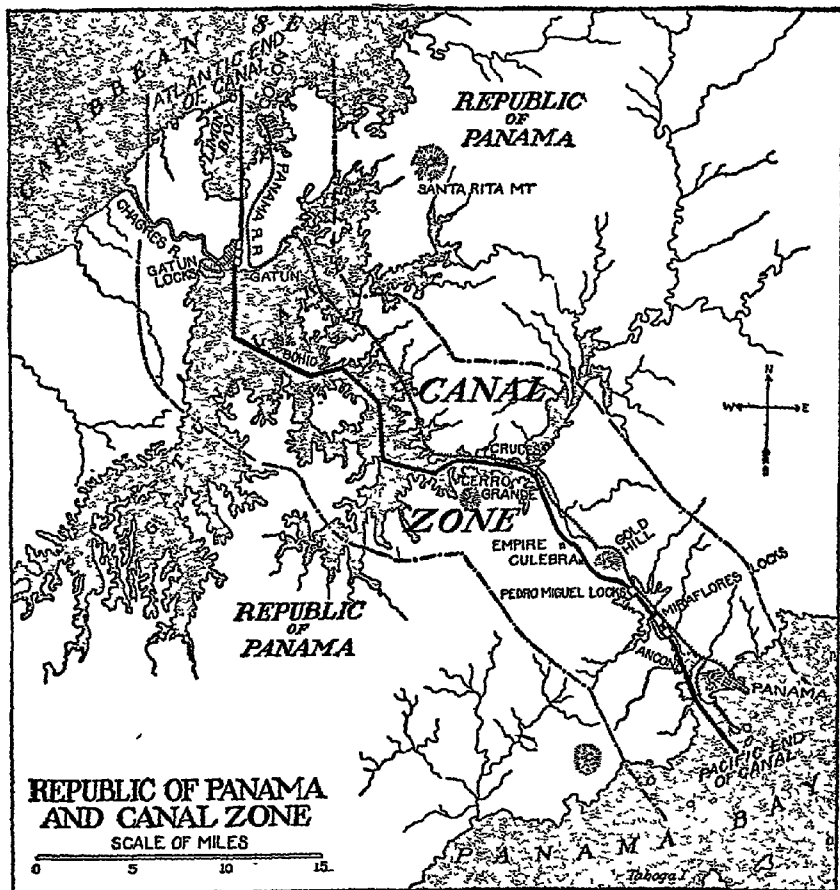
Immediately after the adjournment of the congress the Inter-oceanic Ship Canal Company was organized, and De Lesseps was made president. This company proposed to cut a sea level canal 29½ feet deep, from 72 to 78 feet wide at the bottom and from 92 to 164 feet wide at the surface. At the close of 1888 this company had expended \$200,000,000 and had not completed one-third of the work. Being pressed for funds, the company resorted to bribery as a means of securing additional aid, and their operations grew into the most noted financial scandal in French history. "The company was finally declared bankrupt, and a receiver was appointed.

The receiver was authorized to organize a new company, but on account of legal difficulties, he was unable to complete the reorganization until 1894. The new company, known as the Panama Canal Company, was capitalized at \$13,000,000, and stock to the amount of \$1,000,000 was given to the United States of Colombia. The company abandoned the sea level project and substituted a series of locks in place of it, since this would greatly reduce the expense of construction. During the next few years a little work was done and about \$8,000,000 had been expended when the company again ceased operations.

In the meantime, several events had occurred to keep alive the interest in the Nicaragua route, and in 1895 the Congress of the

United States authorized the appointment of a commission to investigate thoroughly its advantages. This commission, generally known as the Ludlow Commission, made a tentative survey of the Nicaragua route and reported to Congress. In 1899 President McKinley was authorized to appoint a larger

principal reason for this report was the financial difficulty involved in purchasing the right of way from the Panama Canal Company, which wanted \$102,400,000 for their franchises and property, while the estimate of the commission on the value of these assets was \$40,000,000.



commission, with powers to make a more thorough and complete investigation. This is generally known as the Walker Commission, from its Chairman, Rear-Admiral John G. Walker of the United States Navy. After a very thorough investigation, the commission reported in favor of the construction of a canal by the Nicaragua route, stating that the

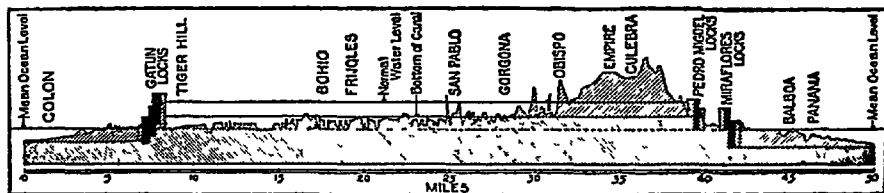
Immediately after this report was rendered to Congress, the French company offered to sell to the United States their entire claims, including franchises, machinery, right of way and the Panama railway, for \$40,000,000, the value placed upon them by the commission. Following this offer the commission made a supplemental report recommending the

chase of the property and the adoption of the Panama route. Meanwhile the House of Representatives had passed a bill authorizing the construction of the canal by the Nicaragua route, but this bill was rejected by the Senate in view of the supplementary report of the commission, and in place of it the Senate passed the Spooner Act. This authorized the President to purchase of the Panama Canal Company all its assets pertaining to the canal, for the sum of \$40,000,000, providing a valid title to the property could be secured and a satisfactory treaty for the construction and control of the canal could be ratified with the United States of Colombia. This measure was accepted by the House and became a law in June, 1902.

In pursuance of the provisions of this act, a treaty was negotiated between John Hay, Secretary of State of the United States, and Dr. Herran, minister plenipotentiary from

tion of the canal on nearly the same terms as were imposed in the proposal rejected by the United States of Colombia. The Panama treaty was ratified by the United States Senate February 24, 1904. It contained a provision that for purposes of administration of canal affairs a strip of land from ocean to ocean, through the center of which the canal was projected, should be ceded to the United States for the sum of \$10,000,000. In addition, for the canal concession, there was to be an annual rental of \$250,000 paid to the Republic of Panama. This strip, designated by the American government as the Canal Zone, covers 475 square miles.

Early in March, 1904, President Roosevelt appointed a canal commission. On May 4th the commission took formal possession of the canal property and the payment of the \$40,000,000 was promptly made to the French company.



PANAMA CANAL IN PROFILE
Upper shading showing the excavated portion

Colombia, and presented to the Senate of the Fifty-seventh Congress, in January, 1903. The treaty provided for the construction and control of the canal by the United States and the payment to the United States of Colombia of \$10,000,000 in gold for the concessions granted, and an annuity of \$250,000 a year after nine years following the ratification of the treaty. At an extra session of the Senate this treaty was ratified on March 18, 1903, and sent to the Colombian government. After several months of delay, during which the treaty was the subject of several stormy debates in the Colombian Senate, it was rejected by that body before its final adjournment in August. This rejection led to the immediate withdrawal of the senators from the state of Panama, and ultimately to the secession of that state and the formation of a new republic, which was soon recognized by the United States government.

Immediately after its organization the Republic of Panama sent to the United States Senate a treaty providing for the construc-

The Canal a Reality. The first chief engineer, John F. Wallace, and his successor, John F. Stevens, both distinguished engineers, were able to do little construction work on the canal because it was not until June, 1906, that Congress finally adopted the report of the engineers in favor of a lock canal. Bids were invited from contractors, but when these were opened in January, 1907, none seemed satisfactory. President Roosevelt therefore placed the work under the control of engineers of the United States army, and Major General George W. Goethals became chief engineer and chairman of the Isthmian Canal Commission on April 1, 1907. During 1907 and 1908 excavation was rapidly pushed, and work on the Gatun and Miraflores dams was begun. In 1909 the power house and concrete plant at Gatun were put into operation and the first concrete was laid. In the next four years the work progressed so rapidly that the canal was finished and ready for operation more than a year before the date set for its completion. On Septem-



PAUL GILBERT

THE PEDRO MIGUEL LOCK

One of the three great locks on the Panama Canal. In entering the canal from the Caribbean Sea, the Miraflores Lock is first encountered, where there is a lift of 55 feet. The Pedro Miguel Lock raises vessels another 36 feet, to a level with Gatun Lake. The Gatun Locks lower the vessel to sea level, 85 feet below.

[See over]



Living Outflow

THE FAMED GAILLARD CUT

Originally called Culebra Cut, this section of the Panama Canal presented difficulties to navigation for several years, because of slides into the canal which closed the channel. It is only a few miles inland from Pedro Miguel Lock. [See over.]

ber 26, 1913, a tugboat was successfully passed through the Gatun locks, and on October 10 the Gamboa dike was blown up, allowing the waters of Gatun Lake to flood the Culebra cut. The first self-propelled vessel to pass through the canal from ocean to ocean was the crane-boat *Alex La Valley*, on January 7, 1914. The total cost of construction was over \$370,000,000.

On August 15, 1914, the canal was opened to commerce by the passage through it of the government steamship *Ancon*, a vessel of 9,000 tons. On board were the Secretary of War and 200 guests. For various intervals in 1915 and 1916 traffic was interrupted because of landslides at Gaillard Cut, formerly called Culebra Cut, but these difficulties were gradually overcome, and since early in 1917 ships have been passing through without delay. Twenty-one years after the opening of the canal the tolls collected from vessels passing through it had equalled the entire cost of construction of the waterway.

Sanitation The completion of the Panama Canal would have been impossible without the splendid work of William C. Gorgas and his aides of the sanitary department. The extermination of the mosquito, the installation of drainage and sewage systems, the war on yellow fever and other tropical diseases—these made it possible for white men to live and work efficiently. Panama City and Colon, for purposes of sanitation only, are also under the jurisdiction of the United States.

Canal Tolls By act of Congress in 1912, American-owned ships were exempted from payment of tolls. This exemption was immediately attacked as a ship subsidy, and was also opposed by Great Britain as a violation of the Hay-Pauncefote Treaty of 1901. On March 5, 1914, President Wilson requested the repeal of the exemption clause, for the reasons given above, and also for its effect on the foreign policy of the United States. The clause was promptly repealed by the House on March 30, and after much debate by the Senate on June 11, with the amendment that the repeal did not mean a waiver of any rights. The amended bill was accepted by the House, and was signed by the President on June 15.

Facts and Figures. The summit elevation of the canal is about 85 feet above sea level. From the Atlantic end of the canal, in Lamon Bay, to Gatun, is a sea level channel 69 miles

long and averaging 500 feet wide. At Gatun the great locks, in three lifts, raise the level to 85 feet. These locks have two chambers side by side, each 110 feet wide, and will accommodate ships 1,000 feet long. From Gatun to Pedro Miguel, a distance of 31.5 miles, the channel of the canal passes through Gatun Lake and Culebra Cut. The lake, which has an area of 165 square miles, is formed by the overflow of the Chagres and other rivers. This overflow is held by two earth dams at Gatun and at Pedro Miguel. The Gatun dam is 800 feet long, including the concrete spillway, and has a width of 100 feet at its crest and 400 feet at the normal level of the water. At Pedro Miguel is another lock, through which vessels are lowered to the level of Miraflores Lake, 55 feet above the level of the Pacific. The two Miraflores locks lower vessels to tide level. The length of the canal from shore to shore is about 41½ miles, but the channel extends seaward for 4½ miles on the Atlantic side and 4 miles on the Pacific, making the total length of the canal and its approaches approximately 50 miles.

Nine and one-half to twelve hours is the time required for the passage of a ship from one end of the canal to the other. No vessel may enter or pass through the locks under its own power, but is towed by electric locomotives running on cog rails laid along the top of the lock walls. The number of locomotives required varies with the size of the ship, ordinarily four are used, two ahead, one on each wall, to pull, and two astern, to steady the motion of the ship.

PANAMA HAT, a fine, hand-plated hat made from the young leaves of a palmlike plant native to Central America and Colombia. The leaves are gathered before maturity, and the soft parts are removed. The fibers are soaked in water to render them pliable, and the weaving is done by hand under water. The best hats are made of a single leaf and are therefore uniform in quality and tint. The fiber-producing plant, a stemless screw pine, has been introduced into the Philippines, and the natives there have become expert manufacturers of these hats. The great centers of manufacture of hats are the Central American states and the countries on the coasts of Northern and Western South America.

PANAMA-PACIFIC-INTERNATIONAL EXPOSITION, an exposition held at San

Francisco, in 1915, to celebrate the opening of the Panama Canal. The grounds occupied the north water front of San Francisco Bay and embraced 635 acres. The cost of the enterprise was \$50,000,000, supplied by the city and the state.

Construction began in October, 1911, and more attention was paid to landscape effect than in preceding world's fairs. The grounds were divided into three sections. In the center was the Court of the Universe, 700 by 900 feet, with a sunken garden in the center. This court was designed to symbolize the meeting place of the Eastern and the Western hemispheres and the statuary, arches and other decorative devices carried out this idea. About this court were grouped eight of the large exhibit palaces. East of these was the Court of Abundance, adorned with Spanish-Moorish architecture, while to the west was the Court of the Four Seasons, designed on a classic Roman model. The Court of Flowers and Court of Palms were other beautiful landscape features.

The buildings were covered with ornamental travertine, and the predominating tone was old ivory, with reds, greens, blue so combined in their decoration as to produce an effect of oriental splendor. Flowers, vines, shrubbery and other ornamental plants and hundreds of pieces of statuary enhanced the loveliness of the scene. The most conspicuous architectural feature of the exposition was the Tower of Jewels, 433 feet high, a dazzling object constructed of many thousands of hand-cut glass prisms of all colors, suspended on a framework in such a way that the slightest breeze set them in motion, producing a gorgeous effect. Brilliantly illuminated at night, the tower appeared even more wonderful.

Other prominent buildings were the palaces of Fine Arts, Agriculture, Transportation, Mines and Metallurgy, Manufacturing and Industry, Horticulture, Liberal Arts, Education and Machinery, the last the largest building on the grounds. In addition to the landscape and large architectural features there were, at the western end of the grounds, the pavilions of foreign nations, buildings erected by the several states of the Union, a live-stock building, a large race track, an aviation field and drill grounds.

PAN-AMERICAN CONGRESS, a congress of delegates from the Republic of Mexico and the Central and South American

states, assembled at Washington, October 2 1889, for the purpose of discussing the formation of an American Customs Union, under which the trade of American nations with one another might be maintained. The congress voted to recommend the establishment of regular communications between the ports of the several American states, common trade and customs regulations, weights and measures, patent, copyright and trade-mark laws, a common legal tender silver coin and a plan for arbitration of all disputes.

The Congress of 1901-1902 The second Pan-American Congress, embracing all the American republics, convened in the city of Mexico, October 22, 1901. The main purposes of this congress were the same as those of the former. Plans for the construction of a railway to connect North and South America, for the establishment of a standard coin which shall be legal tender in all the countries represented, for a uniform system of quarantine and, in general, for bringing the American republics closer together, were recommended. A plan for arbitration based on that of the Peace Conference at The Hague, was adopted.

The Congress of 1906 The third congress was held at Rio de Janeiro, Brazil, in July and August, 1906, and was attended by representatives of all important nations of North America, South America and Central America. The principal topics under discussion were commercial relations, the codification of laws, the regulation of patents, the improvement of methods of sanitation, the construction of the Pan-American railway, the consideration of means of arbitration of disputes between nations and, most important of all, the discussion of the Drago or Calvo Doctrine. This, in effect, declares that debts owing by South American citizens or South American nations to nations of Europe cannot be collected by forcible intervention.

The Congress of 1910 The fourth was held in Buenos Aires, beginning in July. A resolution was offered recommending that all American states bind themselves to submit to arbitration all claims for damage that may be presented by their respective citizens and which cannot be settled through ordinary diplomacy. The name of the International Bureau of American Republics was changed to Pan-American Union (which see). The frequent Congresses held under the auspices of the Pan-American Union have been a potent

influence in establishing friendly relations on the American continents

Later Congresses After the meeting of 1910, no other Congress convened until 1923, because of disturbed conditions during and after the World War. In the latter year a Congress convened at Santiago, Chile, in 1928 one met in Havana, and in 1933, the seventh Congress convened at Montevideo. In all of these the discussions centered around arbitration and trade barriers.

PAN-AMERICAN EXPOSITION, an exposition held at Buffalo, N. Y., from May to November, 1901, to show the progress made by the American republics during the nineteenth century. The expense of the exposition, amounting to \$10,000,000, was assumed by the citizens of Buffalo. The exposition was formally opened May 20 and was closed November 2. Eighteen countries, including Cuba and Haiti, made exhibits. Venezuela, Paraguay and Uruguay were not represented; the United States government spent \$500,000 in special exhibits, and most of the states were represented by buildings and exhibits.

At this exposition, on September 6, President McKinley was shot, while holding a public reception in the Temple of Music.

PAN-AMERICAN UNION, an official organization formed in 1890 as the International Bureau of American Republics and supported conjointly by the twenty-one republics in North America, Central America and South America. The name was officially changed in 1910. The Secretary of State is, by virtue of his office, chairman of the governing board of the Union, and the other members consist of the ambassadors and ministers of the other American republics to the United States. The executive officer is a director-general. The headquarters are in Washington, where the Union occupies a beautiful building, the gift of Andrew Carnegie. *The Bulletin of the Pan-American Union*, a beautiful monthly publication, \$2 per year by mail, contains much valuable information. Two of the main purposes of the Union are the arbitration of disputes between the countries involved and the adoption of a common basis for coinage. See **PAN-AMERICAN CONGRESS**.

PANAMINT MOUNTAINS, a short range, named for a tribe of the Shoshonean Indians, bounds Death Valley, in California, on the west. Though not high, they shut out from the valley the winds from the Pacific

Ocean, and thus are a contributing cause of the intense heat there. Other mountains enclose it on the east.

PANCREAS, *pan'kre-as*, **THE**, a long flat gland, in structure like the salivary glands, that lies just behind the stomach. It is about eight inches long, an inch and a half wide and one inch thick. The pancreas communicates with the intestine by a duct which runs the length of the gland, and pours its contents into the duodenum. The pancreatic juice acts on starch, on fat and on proteids, changing the last into peptones, which resemble those formed by the gastric juice. It separates the fats into minute particles and into their chemical parts, namely, glycerine and an acid peculiar to each fat. The alkaline quality of the juice then makes soap of the fatty acids (see **DIGESTION**). Disease of the pancreas is sometimes a cause of diabetes (which see), and from the pancreas is secured the remedy insulin, a valuable remedy in the treatment of diabetes.

PANCREATIN, *pan'kre-at-in*, used as an aid to digestion, is a yellowish-white powder extracted from the pancreas of a hog, killed about six hours after a full meal. The elements of pancreatin are *trypsin*, which digests proteids; *amylolysin*, which has the power of converting starch into sugar, *steapsin*, which emulsifies fats, and the enzyme that curdles milk. See **DIGESTION**.

PANDORA, in Greek mythology, the first woman on earth. Jupiter, angered at Prometheus for stealing fire from heaven for mankind, determined to punish man as well as Prometheus. To accomplish the former purpose he created a woman. All the gods bestowed gifts on her, and by reason of this she was called Pandora, which means *all gifts*. Mercury was instructed to take Pandora to Prometheus, who refused, however, to receive her. She was then taken to Epimetheus, the brother of Prometheus, who gladly took her into his house. A short time afterward, Mercury appeared with a box, which he left in the care of Pandora, giving her strict instructions not to open it. Her curiosity was too strong, however, and she removed the cover from the box. Away flew all man's blessings, but one, Hope, which Pandora saved by shutting the lid down again. According to some accounts, the box contained evils, which, when Pandora released them, scattered abroad and forever thereafter tormented mankind.

PANKHURST, EMMELINE (1858-1928), a militant English suffrage leader, whose long fight for political representation for women assures her a permanent place in the history of social development. Her father, Richard Goulden, and also her mother were warm advocates of woman suffrage. The daughter was born in Manchester, and was educated in England and in France. In 1879 she married Dr R. M. Pankhurst, who was strongly in sympathy with her attitude toward suffrage, and together the two founded the Women's Franchise League. In 1903 Mrs Pankhurst, then a widow, helped to establish the Woman's Social and Political Union, the organization which has been her chief support in suffrage activities.

About two years later, realizing that the quiet methods she had been employing failed to gain for the suffrage movement the desired recognition, she started a spectacular program which made her a world figure. This program embraced the "heckling" of government speakers, parading and damaging public property. Mrs Pankhurst, as leader of the cause, was held responsible for the disturbances and damages, and in 1913 she was imprisoned. Refusing to eat, she impaired her health, and was released, only to be again taken into custody. Finally she went to Paris, where her daughter, outside the reach of British law, was editing the *Suffragette*. From there she sailed to America and lectured for a season on suffrage. In 1914 the English suffragists abandoned their militant practices for the duration of the World War.

Mrs Pankhurst lived to see women granted parliamentary suffrage before the close of the war, and in 1918 she was a candidate for a seat in Parliament. She was, however, defeated.

PANSY. See **VIOLET**.

PANTASOTE. See **LEATHER**.

PANTHEISM, in philosophy, the doctrine which considers God and the material universe to be identical. Pantheism has been the foundation of nearly all the chief forms of religion which have existed in the world. It was represented in the East by the Sankhya of Kapila, a celebrated system of Indian philosophy. The Persian, Greek and Egyptian religious systems were also pantheistic. Spinoza is the most representative pantheist of modern times. A twofold division of pantheism has been proposed—(1) that which loses the world in God, one being in whose

modifications are the individual phenomena; (2) that which loses God in the world and totally denies the substantiality of God.

PANTHEON, a celebrated temple at Rome, the best preserved of the ancient buildings, built in A. D. 123 by the emperor Hadrian. It is a large edifice of brick, built in circular form, 142 feet in diameter. It has the finest dome in the world, measuring 142½ feet in internal diameter and 143 feet in internal height, and its portico, almost equally celebrated, is supported by sixteen Corinthian columns of Egyptian marble. It is now a church and is known as Santa Maria Rotonda. Raphael and other famous men are buried within its walls. The Church of Sainte G  n  vi  ve, at Paris, one of the noblest of modern structures, was called Pantheon by blasphemous rebels in revolutionary times and the name has persisted. The illustrious men of France are buried there.

PANTHER, one of the cat family, now supposed to be identical with, or a mere variety of, the *leopard*, native to Asia and Africa, and the *puma* of North America, also known as the *cougar* and the *American lion*. In earlier days the animal was most generally known as *painter*, a dialect corruption of its name. See **LEOPARD**, **PUMA**.

PANTOMIME, the expression of thoughts and emotions through gestures and actions and without words. This art was developed by the ancient Romans. In the earliest pantomimes, only one actor was upon the stage at a time, but later several actors appeared together. At first they wore masks. The art of pantomime flourished throughout the days of the Empire, and it later spread to France, where in the seventeenth and eighteenth centuries it had great vogue. The first pantomime in England dates from early in the eighteenth century. It was there that the well-known Christmas pantomime was originated, with the characters of Harlequin, Columbine, Pantaloon and others. At other times than Christmas, pantomimes were given, however, the basis of the acts being found usually in old fairy tales. Only occasional attempts have been made to produce pantomimes in the United States, the most noteworthy one being *Humpty Dumpty*, which gained wide popularity about 1870.

PAPAJOY. See **Pope**.

PAPAL STATES, or **STATES OF THE CHURCH**, the name given to that part of central Italy which, until the latter half of

the nineteenth century, was subject to the temporal authority of the Pope. The territory extended irregularly from the Adriatic to the Mediterranean and latterly comprised an area of about 15,000 square miles. Rome was the capital. The Papal States were, with the exception of the capital and the land immediately adjoining, made a part of the territory of Victor Emmanuel in 1860, and Rome was annexed to the kingdom of Italy ten years later. At this date the temporal authority of the Pope ceased, except over his palace, the Vatican. In 1929 the Italian government ceded to the Church 108 7 acres in Rome, and this act restored temporal power to the Pope, to a degree. See VATICAN CITY, VATICAN.

PAPAW, the name given to two different species of fruit-bearing plants. The tropical papaw, or *papaya*, is cultivated in warm climates, and to some extent in southern and central United States. It grows rapidly, and attains a height of fifteen to thirty feet. The fruit, somewhat resembling a small cantaloupe, is a favorite breakfast dish throughout the tropics generally. The green fruits, as well as the whole plant, abound in a milky sap that contains a valuable digestive ferment.

Another species, also called papaw, is native in the northern and eastern states. This often grows to a height of about twenty-five feet, produces a fruit five or six inches long, an inch thick, and covered with a wrinkled brown skin. This fruit also is edible, considerable quantities of it being sold each year in city fruit stores.

PAPER. The wasp was the first paper maker. Centuries before alphabets were invented, or the art of writing was known, this little insect was busy plying his trade of building paper houses. Let any boy or girl who is surprised at this statement examine an abandoned wasp's nest, and notice the quality of the paper of which it is made. The wasp makes its paper of wood, and it is thought that the wasp nest gave men the idea of using wood in the manufacture of paper on a large scale.

The name *paper* comes from *papyrus*, a plant used by the Egyptians for a fabric to write upon. But papyrus is not paper, and the art of paper making did not originate with the Egyptians. It is not known who was the inventor, but it was made by the Chinese two centuries before the begin-

ning of the Christian Era, and they were probably the originators. Paper was in use in Europe during the eleventh century, and by the thirteenth century it was well known. By the beginning of the fourteenth century it had become common in England, but it was not manufactured there until 1685. The first paper mill in the United States was built near Philadelphia in 1690, but it was more than one hundred years before paper was manufactured in large quantities.

Manufacture. Paper can be made from any vegetable fiber, also from silk and wool, though these substances are not desirable. Formerly all paper was made from cotton and linen rags, and the work was performed entirely by hand labor. The rags were cleaned and ground into a fine pulp which was floated in water. The consistency of the pulp determined the thickness of the paper. The tank was continually stirred to insure an even distribution of the pulp, and the paper was made by dipping into the tank shallow boxes called *deckles*, with bottoms of a wire screen of fine mesh. As the box was raised the water drained out, leaving a thin layer of pulp evenly distributed over the screen. The box was then inverted over a layer of felt, on which the forming paper fell. The layers of felt were placed in piles and pressed to squeeze out more water. They were then spread out and left until the paper became dry enough to hold together, when the drying was completed by hanging the sheets on lines in the yard about the mill, or in the drying room. Paper made in this way had a rough surface and was of uneven quality.

Paper is now made wholly by machinery, and most of it is from wood pulp, but the fundamental processes of the old hand mill are still employed. The pulp is passed through three sets of grinders, called *engines*, to make it fine enough for a good grade of paper. These grinders consist of knives, fastened to revolving cylinders and playing between smaller knives in the bottom of an oval tank. The rotation of the cylinder gives the water in the tank a motion which draws the pulp under the grinder. During the process the necessary bleaching matter, sizing and coloring matter are added. When the grinding is completed, the pulp resembles a quantity of rice and milk. From the last grinder it is sent to the storage tank, from which it is pumped to the paper-making machine.

All machine-made paper is now manufactured on what is called the *Fourdremmer* paper-making machine. It is from 125 to 150 feet long, and its width depends upon the size of the paper it is designed to make. The machine is divided into three sections—that which receives the pulp and forms it into the sheet or web, that which dries the paper, and the finishing rolls, which are usually known as the *calender* rolls. The drying section contains a number of hollow steel cylinders, from one to three feet in diameter; they are heated by steam, which enters through the trunnions on which they turn. The calender consists of a number of solid steel rolls, which press and polish the paper as it passes between them.

The paper-making section of the machine is the most intricate and also the most interesting. It consists of a long, narrow trough, into which the pulp is pumped, an endless belt of wire cloth, about thirty feet long, mounted upon numerous small rollers and having beneath it a number of vacuum boxes which are connected with air pumps; an endless belt of felt, which extends from the belt of wire cloth over the first sets of drying rolls, and the *dandy* roll, which is a small roll covered with wire cloth and placed above the paper at the point where the belt of wire cloth meets that of felt.

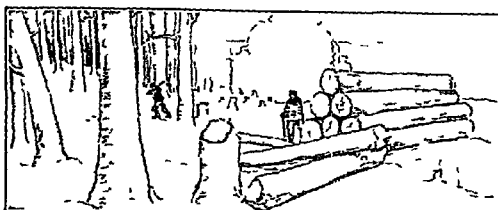
The pulp is pumped from the storage tank into the trough, from which it flows in a wide, thin stream upon the belt of wire cloth. This has a vibrating motion from side to side, which weaves the fiber together and strengthens the texture of the paper as the pulp passes over it. Most of the water falls through the meshes of this cloth as the pulp passes along, and the vacuum boxes assist in drawing out much of the remainder. The even edges of the paper are secured by rubber bands, called *deckle bands*, on each side of the belt. The dandy roll presses down upon the upper surface of the paper and determines the style or quality. When the roll is covered with wire cloth of the same structure as that of the belt, a *wove* paper is made. When the roller contains wire bands which make straight parallel lines in the sheet, a *laid* paper is made. The *water mark*, which is seen by holding a sheet of paper to the light, is produced by placing the design upon the dandy roll and is impressed upon the web at each revolution of the roller. This is a guarantee of the quality of paper.

When the paper leaves the wire belt, it is practically completed, and all of the other operations consist in drying and finishing it. The belt of felt takes the web from the wire belt and carries it to the first set of drying rolls, from which it passes on to succeeding rolls, until all of the water has been expelled. The felt accompanies the web through three or four sets of rollers, until it has become sufficiently strong to withstand the strain of the machine. From the drying rollers the paper passes to the calender machine, if there is one, and as it passes from the calender, it is either wound into rolls or cut into sheets, according to the use for which it is intended.

Material. The enormous demand for paper has for many years made it necessary to employ other material than rags, and now wood is very generally used in the manufacture of paper for newspapers and for the cheaper grades of books. With the exception of transforming the wood into pulp, the process of manufacture is the same as that already described. Wood pulp is made by cutting the logs into short lengths, which are split into pieces and ground down on rapidly revolving grindstones, operated by steam or water power. Wood fiber is made by digesting short pieces of wood in boilers containing a dilute solution of sulphuric acid, heated to a high temperature. The pulp and fiber are mixed in proper proportions to give the paper sufficient strength, and after bleaching they pass through the paper machine in the same manner as paper made from rags.

Some of the coarsest grade of paper are made of wheat straw, and other grades are made of Esparto fiber and corn husks. Most of the tissue paper is made from hemp, old ropes being the material generally used.

Varieties. There are many grades and varieties of paper. The best quality is known as *linen* paper; it is generally used for writing paper and for printing bonds and other documents that are to be preserved for a long time. However, scarcely any of the so-called linen paper is made wholly of linen rags, in fact, much of it contains only a small proportion of linen. The ordinary writing paper and most of that used in printing magazines and books is made of a mixture of rags and wood pulp. However, if a large proportion of wood is used, the paper soon turns yellow on exposure to the light. *Manila* paper takes its name from Manila hemp, though much of



THE FOREST BECOMES A NEWSPAPER All boys and girls are eager to see the page of "funnies" in the daily paper, even if they don't care to read anything else. How many know that the paper on which the news is printed was once a tree growing in a northern forest? This diagram indicates some of the steps on the journey from tree to paper. The whole process of paper making is described in the accompanying article



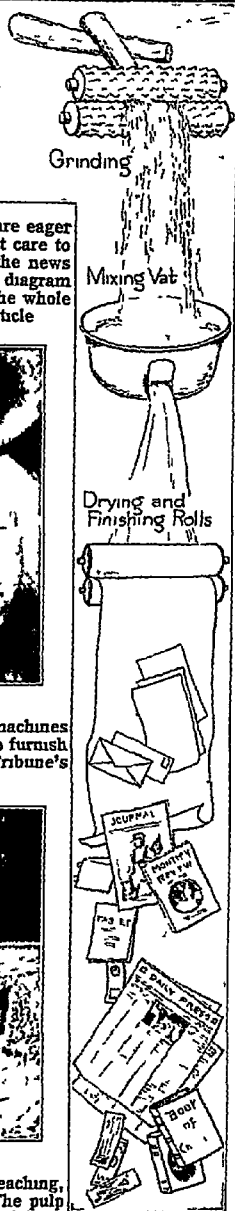
Courtesy Chicago Tribune Company

Poplar and spruce logs are floated down this tank to the grinding machines in which they are quickly reduced to a pulpy mass, or "slush." To furnish the paper for an average issue of the Chicago Sunday Tribune the Tribune's own mill, at Thorold, Ontario, consumes 54 acres of trees.



Courtesy Chicago Tribune Company

From the grinders the pulp goes to huge mixing vats in which bleaching, coloring and sizing materials are added, also clay for "filling." The pulp is now rolling out of the machine after the water has been squeezed from it. The workman is examining a handful to determine the quality.



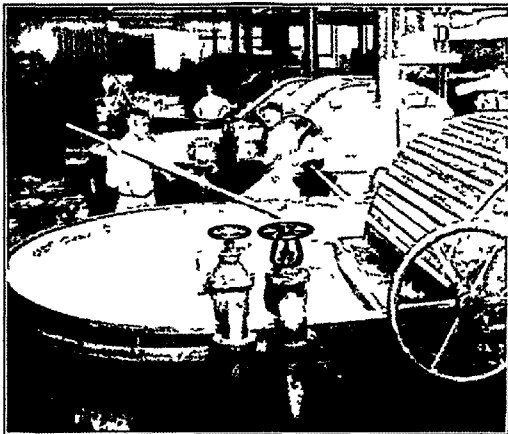
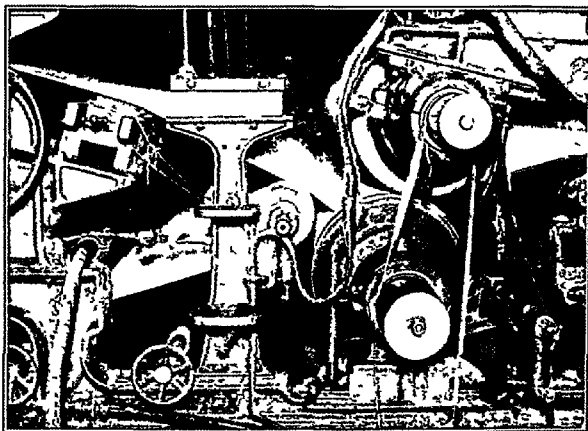


Photo from Underwood & Underwood

A battery of beaters in a mill at Bangor, Maine. The liquid pulp, looking like a mixture of rice and milk, is beaten and churned till perfectly smooth and even, by beating wheels which are under the drums. Examine a page of your favorite book, hold it up to the light. Can you believe that this sheet, clear white and of even texture, was once part of a tall tree bending over some little lake in the north woods? A tree in the sunshine—a shelf of books in the library. The music and light of Nature for a few years—the joyous and wise and great thoughts of the human mind preserved for centuries. What a history!

A small section of a great paper-making machine in the Tribune mill at Thorold, Ont. The sheet of new, wet paper is shown making its first jump from the couch rolls, at the end of the wire screen, to the first of a series of drying rolls. To furnish the paper for one average issue of the Sunday Tribune the mill consumes 54 acres of trees, 21 tons of sulphur, 63,000 electric horsepower, 18,200,000 gallons of water.



Courtesy Chicago Tribune Company

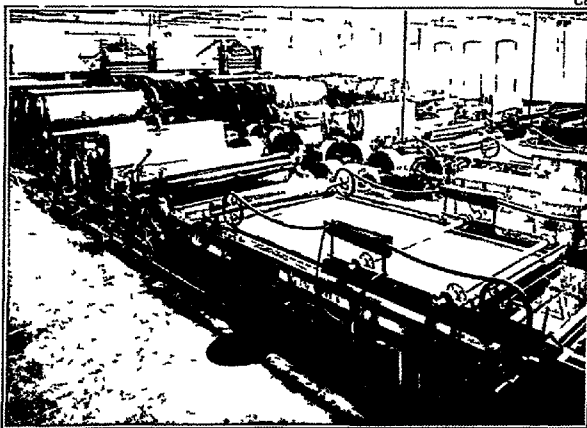


Photo from Underwood & Underwood

This long machine receives at the near end a thin, wet sheet of pulp and turns out at the other end the reels of finished paper. Each machine can turn out a continuous strip of paper from 180 to 197 inches wide and from 600 to 1,000 feet in length every minute. This is the equivalent of 5 miles of paper one foot wide every sixty seconds from the 5 machines in the Tribune mill.

the paper so named does not contain any of that material *Japanese* and *Indian* papers are noted for their peculiar texture, which is due to the method employed in their manufacture. These are usually handmade.

Paraffin paper is made by coating ordinary paper with paraffin. Since it is waterproof it is extensively used for packing articles that should be protected from moisture. *Vegetable parchment* is made by treating common paper with sulphuric acid and other chemicals, then washing and drying. It is strong, flexible and waterproof.

The United States manufactures more paper than any other country, the output of all kinds exceeds 9,000,000 tons a year.

Related Articles Consult the following titles for additional information
Book *Papyrus*
Bookbinding *Printing*

PAPIER-MACHE, *pah pyay' mah shay'*, a substance made from paper pulp. It is a tough, light, durable material from which many useful articles are made. The pulp while damp is mixed with glue, resin or other material to make it hold together, and is easily molded into any desired shape. Mixed with quicklime, egg-white or copperas it is waterproof and can be used to make pails, tubs and the like. Papier-mâché is also used for making trays, boxes, dolls' heads, anatomical models and many other articles. It is sometimes used as a substitute for stucco.

PAPINEAU, *pap'pe-no'*, **LOUIS JOSEPH** (1789-1871), a Canadian orator and politician, born in Montreal and educated at the seminary in Quebec. He was elected to the assembly of Lower Canada in 1809. He commanded a company of militia during the War of 1812, but saw no real service. In 1815, already recognized as the leader of the French Canadian party, Papineau was elected speaker of the assembly for Lower Canada. In 1820 he was appointed a member of the Executive Council, but resigned in 1823, convinced that he was without influence in that body. He was constantly in opposition to the government and opposed the union of Upper and Lower



LOUIS JOSEPH
PAPINEAU

Canada. The grievances of the French Canadians were many and serious, but they do not seem to have justified the extreme attitude which led Papineau into the open rebellion of 1837. In November, 1837, when Papineau was formally charged with high treason, he fled to the United States to avoid arrest. From 1839 to 1847, when amnesty was granted, Papineau lived in Paris. On his return to Canada he was elected to the lower house of Parliament and continued to demand the "independence of Canada, for the Canadians need never expect justice from England, and to submit to her would be an eternal disgrace." He later led in the agitation for the separation of Upper and Lower Canada, and in 1854 retired from public life.

PAPRIKA, a condiment prepared from the dried ripened pods of a species of capsicum (which see). Paprika, while having the bright red color of cayenne, is of very mild flavor. It is much used in salads.

PAPUA. See **NEW GUINEA**.

PAPYRUS, a water plant which furnished the material upon which the ancient Egyptians did their writing. The root is very large, hard and creeping, and the triangular stem is several inches in diameter and from twelve to fifteen feet high. Formerly the plant was extensively cultivated in Lower Egypt, but it is now rarely seen there. It grows in other warm parts of Africa, however, and in Sicily and Palestine. The inhabitants of some countries where it grows manufacture it into various useful articles, including sail cloth, cordage, wearing apparel and boats.



PAPYRUS PLANT

The ancient Egyptians used it chiefly for paper, which they prepared from the stems. These were cut in thin strips, the strips were laid side by side lengthwise and then covered with other strips laid across

them The whole was fastened together by some gummy substance and became under the process a long, tough, smooth mat which could be rolled up or opened at convenience. The writing materials were a reed pen and an ink made of animal charcoal and oil. Thousands of these papyri or papyrus rolls still exist Many of them were found in the ruins of Herculaneum, but their contents, so far as deciphered, have been of only moderate value Papyrus was used in Europe till the Middle Ages and was an important export from Egypt. See BOOK; MANUSCRIPTS; PAPER

PARA, *pah rah'*, or **BE'LEM**, **BRAZIL**, capital of the province of Para, and one of the greatest rubber markets of the world, is situated on the right bank of the estuary of the Para River, eighty-five miles from the Atlantic Ocean. The principal buildings are the governor's palace, a cathedral and a bishop's palace There are in the city a lyceum, a seminary, a public library, a botanical garden and a museum. Para has unusually attractive buildings and homes and is one of the most delightful cities in South America The port, defended by forts, admits vessels of large size The principal exports of the city are cacao, rubber, Brazil nuts, isunglass, rice and drugs Other exports are numerous. Population, 1930, 280,000

PAR'ABLE, a short fictitious narrative, founded on incidents and facts of every-day life, intended to convey a moral or spiritual truth The Bible contains numerous parables, which, by reason of their directness and close relation to the lives of the hearers, surpass all others that have been written. One of the best known of those in the Old Testament is the story of the ewe lamb, told by Nathan to David, among those in the New Testament are the parables of the sower, the tares, the mustard seed, the good Samaritan, the prodigal son, the rich man and Lazarus, the ten virgins and the talents

PARACELSUS, *pair a sel'sus* (1493-1541), a German physician, born and educated in Switzerland After studying chemistry and medicine in the University of Basel and alchemy under the famous bishop of Wurzburg, he traveled from place to place, practicing irregularly and gaining a reputation for his cures From 1526 to 1528 he lectured at the University of Basel, and was in the latter year expelled because of drunkenness and other disorderly behavior. It is said that

after he had wandered about Europe for several years he was thrown from a window in Salzburg by the servants of a physician to whom he had given offense, and that he died of the fall Paracelsus did much to explode certain fallacies in medicine, and he laid the foundation for the practice of curing disease by specific remedies. He is one of the classic examples in history of unbalanced genius.

PARACHUTE, *pair a shoot'*, in its simplest form an apparatus of umbrella shape and construction, usually about twenty feet in diameter, attached to balloons or airships, by means of which the aeronaut, or aviator, may descend slowly from a great height

As developed in modern usage, the parachute is made of untreated silk, which does not crease readily When spread open, it is about 24 feet in diameter The shroud lines, attached to its outer edges, are gathered and fixed to the "harness" worn by the aviator The standard method of using the parachute is for the jumper to clear the aircraft at any point, free of obstruction, that is convenient. After falling clear and within the first few seconds of his descent, he gives a sharp pull at the rip cord which releases the parachute from its case Sometimes a smaller "pilot chute" is first opened, to provide the strong pull to open the main parachute When there is plenty of altitude a long "free fall" is not considered dangerous The percentage of casualties in recent years is very small See BALLOON

PARADISE LOST, an epic poem by John Milton, founded on the Biblical story of the fall of man. It opens with the sufferings of Satan and his crew after their expulsion from heaven Satan tells his workers of the creation of man; and he calls a council to plan a way to bring about man's undoing. The council meets in Pandemonium Hall, and there it is decided that Satan shall go himself to the newly-created world. The Almighty foresees the fall and, with His Son, plans for man's redemption. Meanwhile Satan has entered the orb of the sun, and has there learned the route to the new world. On entering the Garden of Eden he hears Adam and Eve talking of the forbidden fruit The Angel Raphael is sent from heaven to tell Adam about Satan and to warn him of his danger After the angel had departed Satan enters into a serpent and, seeing Eve alone, speaks to her. Eve's astonishment at hearing the

serpent speak is increased when it tells her that it has eaten of the "tree of knowledge" and gained both speech and wisdom. Eve overcome with curiosity, tastes the fruit and induces Adam to eat also. Satan returns to hell elated over his success, and the angel Michael is sent to expel the guilty pair from Paradise. The poem ends with the expulsion and Eve's lamentation. See MILTON, JOHN.

PARAFFIN, *par'afin*, a tasteless and odorless waxlike substance, used extensively in making candles. It is obtained from the mineral ozocerite, but chiefly, by distillation, from petroleum. In Germany it is prepared from certain kinds of brown coal, and in Scotland, an important paraffin producer, it is made from boghead coal and certain bituminous shales. In addition to candles, numerous other things are made from paraffin. It is used in the manufacture of wax paper, matches and certain fabrics and extensively as a protective covering for preserved fruits. See HYDROCARBONS; PETROLEUM.



typical native types

PARAGUAY, *par'a gwai*, or *pah ra gwai*, a South American republic in the interior of the continent, enclosed on all sides by larger countries. Brazil touches it on the north and east, Bolivia adjoins it on the northwest, and Argentina bounds it on all other sides. The exact boundary lines are a matter of dispute, as a great territory comprising about 100,000 square miles, lying between the Paraguay and Pilcomayo rivers, is claimed both by

Bolivia and Paraguay. Paraguay proper, lying between the Paraguay and Alta (Upper) Parana rivers, has an estimated area of 61,647 square miles. Economically Paraguay has the position of a new country, although its history dates back to the sixteenth century. Over this inland area, called the Gran Chaco, which is of little value, the two nations made war for three years, but in 1935 they agreed to submit their respective claims to arbitration.

People and Cities. In 1932 the population was estimated at 870,200. The native Indian stock, a people known as Guaraní, are found chiefly in the rural districts. In the

towns and cities people of mixed Spanish, Indian and negro blood are found. There are about 60,000 foreigners in the country, mostly Argentines, Italians, Brazilians, Spaniards, Germans, French, Uruguayans and English. The Guaraní are a strong, uncorrupted people, who live simply and adhere to the virtues of their forefathers. They are religious, patriotic and industrious. In the disputed region, which is only partially explored, there are about 50,000 Chaco Indians, who live under the most primitive conditions.

Asunción, the capital and largest city, had an estimated population of 94,456 in 1934; other towns are Villaria (35,260), Concepción (13,657), Luque (16,000), and Encarnación (12,000). These figures are all estimates. The main railway of the country joins Encarnación and Asunción, and there is through train service between Asunción and Buenos Aires, capital of Argentina.

Physical Features. The whole surface belongs to the basins of the Paraguay and Parana rivers, numerous tributaries of which intersect the country. Along the Paraguay and in the south, adjoining the Parana, are extensive swampy tracts, westward of the Paraguay the country is little known. Elsewhere the surface is well diversified with hills and valleys and rich alluvial plains. The climate is agreeable, the mean annual temperature being about 75°.

Production and Industry. The natural fertility of the soil is shown by a vegetation of almost unequaled luxuriance and grandeur. In the forests are found at least sixty varieties of timber trees, besides dye-woods, gums, drugs, perfumes, vegetable oils and fruits. Many of the hills are covered with the *yerba mate*, or Paraguay tea. The larger plains are roamed over by immense herds of cattle, which yield large quantities of hides and tallow, and on all the cultivated alluvial tracts sugar cane, tobacco, rice and maize are raised. The chief imports are textiles, foodstuffs, hardware, fancy goods, chemicals and liquors. The exports include hides, mate, oranges, tobacco, timber, cattle, preserved beef and quebracho extract (used for tanning). Great Britain is Paraguay's most important overseas customer.

Government and Religion. The executive power is vested in a President, who is elected for four years and is assisted by five Ministers. The legislative department consists of

a Congress comprising a Senate and a House of Deputies, the members of each being chosen by universal suffrage. According to electoral law of 1916, there are twenty Senators and forty Deputies. The Roman Catholic Church is the state Church, but all religions are tolerated.

Education. Education is free and compulsory by law, but not all sections are provided with schools. There are about 1,050 primary schools in the country. High schools, called national colleges, are maintained in six cities.

History. Paraguay was originally a Spanish colony, the first settlement being made in 1535. In 1608 a number of Spanish Jesuits established a powerful and well-organized government, which lasted till 1758, when it was overthrown by the Brazilians and Spaniards. Early in the nineteenth century its isolated position enabled it by a single effort to emancipate itself from Spanish rule. Doctor Francia, secretary to the revolutionary junta in 1811, was elected consul, but exchanged the name for that of dictator in 1814, and thenceforward, by a rigorous system of espionage and the strict prohibition of all intercourse with other nations, he retained his position till his death in 1840. In 1844 Don Carlos Antonio Lopez was elected President for ten years, and soon after, the country was declared free and open, both to foreigners and foreign commerce. Don Carlos Lopez remained President of Paraguay till his death in 1862, when he was succeeded by his son Francisco Solano Lopez, who concluded treaties of commerce with the United States and the leading European nations and did all in his power to promote the growth of agriculture and industry in the land. But a disastrous war with Brazil and the Argentine Republic, which broke out in 1864 and only closed with the death of Lopez in 1870, caused the death of far the greater portion of the male adults and entirely checked the progress of Paraguay. A popular constitutional government was then established, and the nation began the process of reconstruction.

Related Articles. Consult the following titles for additional information:

Asuncion	Paraguay (river)
Mate	Parana (river)

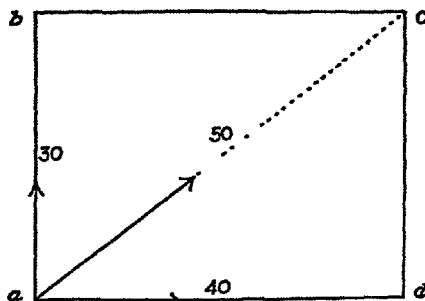
PARAGUAY, a river of South America, which is a valuable highway of trade for Paraguay and Brazil. It rises on the plateau of Matto Grosso, in Brazil, flows in a generally southeasterly direction and joins the

Parana, after a course of almost 1,500 miles. Asuncion, the thriving commercial capital of Paraguay, is situated on its banks. The Paraguay was discovered by Sebastian Cabot in 1526.

PARAGUAY TEA. See **MATE**.

PARALLELOGRAM. See **QUADRILATERAL**.

PARALLELOGRAM OF FORCES, an important principle of dynamics, discovered by Newton, which may be stated thus: If two forces, acting in different directions on a body at the same time, be represented in magnitude and direction by two straight lines meeting at the body, their resultant effect, in giving motion to the body, is that of a force represented in magnitude and direction by the diagonal of the parallelogram of which the two former lines are two sides. A body at



a is acted upon by two forces *x* and *y*, acting at right angles to each other. Let *x* have a force of 30 pounds and *y* a force of 40 pounds. If we construct the diagonal *a b c d* (see illustration), we shall find that the path of the body is represented by the line *a c*, and that it moves with a force equal to 50 pounds. See **COMPOSITION OF FORCES**.

PARALYSIS, the impairment or loss of the power of motion. This loss may affect certain parts of the body only, or it may cover one side of the body, or the upper or the lower half, or it may be general and affect both upper and lower extremities. Sometimes there is a loss of motion, while sensibility is retained; and rarely, there is a loss of sensibility, while the power of motion is retained. Paralysis is not a disease, but is a manifestation of disease, usually in a part of the body remote from that affected by paralysis; as, for instance, a wound or a disease of a nerve trunk may cause paralysis in the extremities to which the trunk leads. The ordinary form

of apoplexy or paralytic stroke is accompanied by a loss of motion on one side of the body, usually in the extremities and in the muscles of the face and tongue. It is frequently caused by the forming of a blood clot in the brain.

Paralysis is sometimes cured by electrical treatments, massage and similar measures, but the treatment in each case depends upon the nature of the ailment. The treatments that are used to remedy paralysis following infantile paralysis and meningitis should be persisted in for months if necessary. See INFANTILE PARALYSIS; MENINGITIS.

PARAMARIBO, SURINAM, the capital and chief center of trade of the colony, is about sixteen miles above the mouth of the Surinam. It is a well-built city and is the center of the Dutch West Indian trade. Its chief exports are sugar, rum, molasses and rubber. Population, about 50,000. Surinam was formerly called Dutch Guiana.

PARANA, *pah rah nah'*, a river of South America, the largest on the continent except the Amazon. It is formed by the union of the Rio Grande and the Paranahyba rivers, and early in its course forms the boundary between Brazil and Paraguay. Sweeping around the southern end of the latter country, it separates it from Argentina, through which it flows in its lower course, and finally discharges into the Plata, an inlet of the Atlantic. About 1,800 miles from its mouth it is joined by the Paraguay, its largest tributary.

It is one of the most important water systems in the world, and its drainage area is nearly equal to that of the Mississippi. Seagoing vessels ascend 400 miles, and smaller steamers 1,000 miles. Several hundred miles from the Plata the Parana begins to divide into two parallel channels, and its total width near its mouth is thirty miles. Above its confluence with the Paraguay the river plunges over a great escarpment—the Falls of Guayra. It then rushes through a deep rocky gorge and is broken by rapids. One of its tributaries, the Iguazú, enters it at Iguazú Falls, a magnificent cataract which rivals Niagara in volume and beauty.

PARASITE, a plant or an animal which attaches itself to some other plant or animal and draws its nourishment therefrom. Some animal parasites such as tapeworms and trichina live on the interior of the body, inhabiting some particular organ, while others,

such as ticks, fleas, lice, live on the outside. Among the most destructive of vegetable parasites are smut, which is a good example of internal vegetable parasite, rust and mildew. Parasites are always injurious to the host, or body on which they live, causing depletion of strength and sometimes death. Mistletoe, widely distributed throughout the southern part of the United States, is one of the largest of tree parasites. Dodder, another common vegetable parasite, is injurious to clover and alfalfa. See BOTANY, subhead *Uninvited Guests*.

PARASITIC DISEASES, diseases produced by parasitic animals or plants. See BACTERIA AND BACTERIOLOGY, DISEASES OF PLANTS.

PARCEL POST, or fourth-class mail, is that branch of the United States post office system that transmits all parcels over 8 ounces in weight containing circulars, books, catalogs and other matter wholly in print, together with merchandise, farm and factory products, seeds, cuttings, bulbs, roots, scions and plants and all other mailable matter not embraced in the first and second classes. The same matter in parcels weighing 8 ounces or less is embraced in third-class mail.

The limit of weight is 70 pounds, with a lesser weight for places in the Philippines outside of Manila. The limit in size is 100 inches in length and girth combined.

Invoices may be included with merchandise, also a card of greetings such as, "Merry Christmas." Public library books may bear printed or written marks used in keeping records and may be sent at a special low rate within state boundaries.

A first class letter with required postage attached may be affixed to a parcel on the address side. Parcels may be sealed if the prescribed inscription authorizing opening the parcel for inspection is *printed* on the wrapper.

Meat and meat products are mailable subject to meat inspection laws. Game food, skins, plumage, etc., are mailable when the game is lawfully killed and the products are in good shipping condition.

Mailing rates may be learned at any post office. Utmost care is required in wrapping and addressing parcels. They may be insured or sent C O D. A mere certificate of mailing may be obtained at a cost of one cent per parcel. Special handling and special delivery involve small additional costs.

PARCHMENT, the prepared skin of sheep, goats and other animals, used chiefly as a writing material. The heavy skins of the old animals and of asses are used for making the parchment of drum heads, while the skins of calves, kids and unborn lambs are used for making a superior quality of parchment known commercially as *vellum* and used for rare book-bindings, college diplomas and certain legal documents. The first step in the preparation of parchment is removal of the wool or hair. The skin is then placed in lime to remove the fat, and is afterwards dressed with scrapers and rubbed with pumice stone to give it a uniform surface and thickness.

PARDON, the remission of the penalty attached to a crime. In the United States, the pardoning power is lodged in the president and the governors of the various states and extends to all offenses except those which are punished by impeachment after conviction. In some states, concurrence of one of the legislative bodies or a pardoning board is required. In Canada, pardons are granted by the Crown, acting through the Governor-General.

PARENT AND CHILD. In family life the relation of parent and child stands only second to that of husband and wife in dignity and importance.

Legal Relations. Now children are no longer considered legally the property of their parents. Father and mother in general have equal rights in the control of their children, this principle is especially clear when by unavoidable circumstances the mother becomes the head of the family. Likewise their obligations toward the children are equal, subject to their respective financial abilities.

The parent may punish the child when necessary, but for cruel and unjust punishment he is liable to arrest and prosecution for assault. Parents are entitled to the help of a child in services about the home and may lay claim to the earnings of minor children who work for wages.

Children under age may not marry without parental consent given to the officials issuing the license to marry. Parents and in some states grandparents when poverty-stricken and unable to work may secure support from children by a legal suit.

Social Relations. The child in the home completes the family circle. No tribe or nation is known to have disowned child-rear-

ing completely. Usually every child born is to be cared for until he is an adult.

Among primitive people infanticide or child murder occurs when food is scarce, when a rare sacrifice to some god is required, when the child interferes with rapid escape from danger or is born deformed. But the world over mother and father love generally bind parents and children enduringly.

Society has found that the parent-child relation is so valuable that many legal and customary regulations protect it. Children cannot be taken from their parents without permission of a court. Parents may defend their children by force, may control and guide them in matters of play, study, work and of marriage. Parents may give their property to their children in preference to all other private claimants.

Out of the spirit of the family countless social organizations have sprung up, serving needs that parents cannot meet by private efforts. Note especially the orphanages, children's clinics and hospitals, societies for preventing cruelty to children and for educating them. In fact vast labors for the common good of all mankind have developed out of the unborn parental impulses that arise in human beings everywhere.

Parenthood is a fortunate, a highly civilizing experience. The long period of infancy and childhood is a blessing to humanity, since it provides home experience and parental training that are needed to keep future generations from falling back into barbarism and savagery.

Related Articles	Consult the following
titles for additional information	
Child Labor	Ethics
Child Study	Kindergarten
Child Training	Parents and Teachers
Children's Diseases	(below)
Children, Reading for	Pedagogics
Children, Societies for	Psychology

PARENTS AND TEACHERS, NATIONAL CONGRESS OF, an organization of parents and teachers with local and state organizations throughout the country. The National Congress of Mothers was organized by the help of both men and women in 1897. The growth of cooperation between parents and teachers led to a change of name in 1908—National Congress of Mothers and Parent-Teacher Associations. The name at the head of this article was adopted in 1924.

The organizations efforts are directed to the following objectives: health and safety, worthy home membership, mastery of tools

and technics with a spirit of learning, faithful citizenship, vocational and economic effectiveness, wise use of leisure and ethical character

Some of the more specific purposes are to form a partnership of home and school, to establish cooperation between parents, to promote the understanding of school standards and activities, to comprehend and support the school system, to develop programs of study courses on child welfare, to train persons for the profession of parenthood, to develop constructive and protective activities, to prevent mistakes and misunderstandings, to promote welfare legislation, and to secure cooperation with other organizations

The work of the Congress is accomplished through the departments of organization and research, extension, public welfare, education, home service and health. Publications include the magazine, *Child Welfare*, a year-book and the proceedings of the annual convention. Headquarters is in Washington, D C

This organization has a far-reaching influence on the educational policies of school men and is the most dependable source of popular support for the public school system. The great educational awakening among parents is largely attributable to the work of this Congress

PARESIS, (also pronounced *pa re'sis*) is a nervous disease which begins with such mild symptoms as excitability and a tendency to be irritable, and progresses gradually to a condition of paralysis and insanity. It is more prevalent in males than in females, and occurs most frequently between the ages of thirty-five and forty. The underlying cause is syphilis, but there is usually present a weakened condition due to use of alcohol, mental shock, injury to the head, etc. The course of the disease is usually four years. Death may result from convulsions, exhaustion, hemorrhage of the brain or some complication.

PARIS, in Greek legend, the son of Priam and Hecuba. His mother dreamed before his birth that she had brought forth a firebrand, and having been informed by the priests that this meant that her son should cause the destruction of Troy, she had the child left on Mount Ida to die. Here, however, he was found by a shepherd, who brought him up as his own son. When he grew to young manhood, his great beauty

won him the love of the nymph Oenone, whom he married. They were happy together until, one day, Paris was called to decide a beauty contest between Juno, Minerva and Venus, all of whom claimed the apple which, marked "For the fairest," was thrown into their midst (See **APPLE OF DISCORD**). Each of the goddesses promised to Paris a reward if he would decide in her favor, but the offer of Venus of the most beautiful woman in the world as his wife was most to his taste, and he awarded the prize to her. While on a visit to Greece, Paris was entertained at the home of Menelaus, king of Sparta, whose wife, Helen, the most beautiful woman of her time, he treacherously made love to and carried off. This act caused the Trojan War. After the capture of the city he killed Achilles by shooting him in the heel, and he was himself killed by Philoctetes. See **HELEN**, **TROY**.



PARIS, *par'is*, FRANCE, the beloved *Pa ree'* of all Frenchmen, is the capital and largest city of the republic, and since surpassed in population by Tokyo, Moscow, and Shanghai, is now eighth among the cities of the world. In the fourth century the name Paris was given to a settlement which first appeared on an island in the River Seine (Isle de la Cité, see map, page 2736), more than 200 years earlier, and in its earliest days

it was a place of importance, there have been only brief periods since medieval days when its influence upon European affairs has not reached the limits of the continent.

There is another side to this city that commands world attention. Paris is a unique mixture of the grave and the gay. It is the undisputed fashion center of the world, and the greatest pleasure-loving city of Europe, its artistic trend finds expression in magnificent art treasures, in education, students from all over the world bear testimony to its unexcelled facilities.

Location and Population The French capital lies on a level plain in the northern part of the country. It is built on both banks of the River Seine. 110 miles in a direct line

PARIS

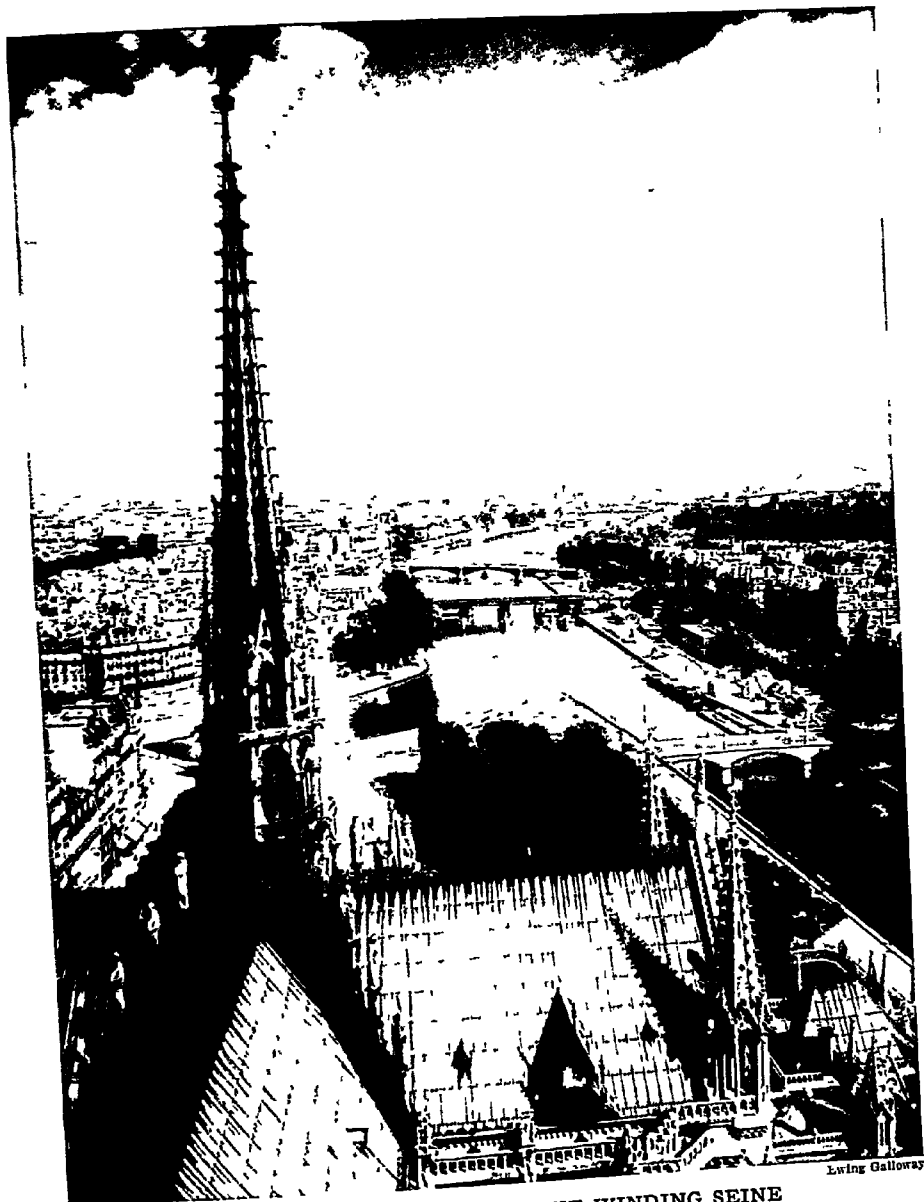
from the mouth Low hills, never more than 420 feet high, encircle the plain and are themselves surrounded by an outer range of elevations, most of them strongly fortified. The elaborate system of fortifications, considered impregnable before the World War, includes a wall erected about the city. Paris is 285 miles southeast of London by way of Dover and Calais, 108 miles southeast of Havre and 358 miles northeast of Bordeaux.

of the population is composed of foreigners, representing most of the nations of Europe. General Description. Paris grew without a definite plan, and at one time had a dense population living in crowded houses on narrow, crooked streets. Within the past century, however, the city has been remodeled, wide avenues have been opened in every direction, and communication is rendered direct and easy by numerous street car lines and



In population, Paris has fallen from its eminence as second city of Europe, Berlin and Moscow have moved ahead, and it is now fourth. At the beginning of the 19th century its population was 547,000, a hundred years later, 2,714,000, and in 1931, 2,391,020. The French capital is one of the most densely-populated cities in the world, having two and one-half times as many people to the square mile as London. Perhaps one-tenth

omnibuses. Besides these, Paris has a system of underground street railways that is as perfect in appointment and management as any in the world. As a whole it is one of the most beautiful cities of the world, and though in its reconstruction thousands of people suffered from the arbitrary opening of streets and the destruction of old buildings, yet the roomy avenues, the perfect sanitation and the magnificent appearance of the new city have



Lwing Galloway

A GLIMPSE OF PARIS AND THE WINDING SEINE

From the lofty spire of famed Notre Dame Cathedral there is a typical view of the great city. Three of more than thirty bridges which span the river are shown. The buildings are of almost uniform height, there are no skyscrapers of the American variety.



UNUSUAL SIGHTS IN PARIS

Upper left, a street artist at work, upper right, view of one of the famed sidewalk cafes, of which the city has many, below, a Montmartre shop, where the canvases of poor artists are offered for sale.

justified the action of its builders. The Seine is a great thoroughfare for trade and commerce, and its sides are lined with magnificent stone quays, which keep its water within bounds and furnish landing stages and broad esplanades for pleasure and trade. Near the center of the city the Seine divides into two streams and creates the Ile de la Cité, which is covered with fine public buildings. The river, which varies from 300 to 500 feet in width, is spanned by more than thirty magnificent bridges, one of which has been in existence for over 400 years and others for more than 300 years. Many of the bridges are adorned with historical relics or with statuary designed to commemorate great events.

Steam and electric roads connect Paris with its numerous famous suburbs—Boulogne and its famous park and race courses, Versailles, with its palace and beautiful gardens, Saint-Denis, with its cathedral where the kings of France are buried, and a score of others near and farther, each abounding in historic or artistic interest. The railroads which connect Paris with the other cities of Europe are numerous and well equipped. They enter the city from different quarters and terminate in fine stations, all of which are easily reached by the street and underground railways.

Streets, Parks and Boulevards. Paris is famous for its handsome boulevards and streets. There are three circles of boulevards, the inner one, or *Grands Boulevards*, enclosing the oldest section, the next circle surrounds the old suburbs, and beyond this is the boulevard system extending about the newer suburbs. The city is known, too, for its many handsome squares.

In the northwest is the *Place de l'Etoile* (Place of the Star), whence radiate twelve great avenues. Chief among these is the *Champs Elysées*, running southeast, under slight changes of direction and name, to the *Place de la Bastille*. There it meets other diverging streets, one of which continues in the same general direction to the *Place de la Nation*. The *Champs Elysées* proper terminates in the *Place de la Concorde*, which once streamed with the blood of the Revolution. Beyond is the garden of the *Tuileries*, now the beautiful playground of crowded Paris, and still farther, the *Palace of the Louvre*, with its wonderful treasures of art and history. Across the river to the south

of the *Champs Elysées* are the spacious grounds of the *Hotel des Invalides* (a home for old soldiers), which almost meet the *Champ de Mars* and the wide tract that faces the *Palace of the Trocadero*, on the north side of the river.

South of the river, also, are the charming gardens of the *Luxembourg*, and farther east, next the river, is the *Jardin des Plantes* (botanical garden), with its marvelous living collection of plants from all parts of the world. In the northeastern part of the city is the beautiful park of the *Buttes Chaumont*, where advantage has been taken of high hills and deep ravines to make a most delightful garden. Just outside of the city, to the west, is the *Bos de Boulogne*, a magnificent park, much of which is still in its natural state, where great trees shadow acres of hillside, interspersed with meadows, lakes and gardens. Among them all run the beautiful drives and charming walks that have made this park famous for many years. Across the city, at the southeast, is the *Bos de Vincennes*, a smaller, but almost equally beautiful, tract. The cemetery of *Montparnasse*, in the southern part of the city, and the cemetery of *Père Lachaise*, in the east, are beautifully kept and attract many visitors to the graves of the famous people buried there.

Public Buildings, Monuments and Institutions. Paris has long been famed for the magnificence of its churches, palaces and other public buildings. Chief of these is the great *Palace of the Louvre*, located on the north bank of the Seine, almost in the center of the city. Directly south of it, and some distance from the opposite side of the river, is the *Palace of Luxembourg*, once a royal residence, but now the home of great collections of modern paintings and statuary. The *Palace of the Trocadero* fronts the Seine on the north bank. It is a huge oriental building, in front of which is a great ornamental fountain. The palace was built in 1878 for the *International Exposition*, and it still contains many treasures of sculpture and ethnology. Across the river are the *Eiffel Tower*, and the *Champ de Mars*, where have been erected the buildings for other international expositions. The *Hotel des Invalides* has been in existence since 1670, and in connection with it is a military museum, with a fine collection of relics. The President of France makes his official home in the *Palais*

de l'Elysée, northwest of the Place de la Concorde, while across the river, south of the square, is the building of the Chamber of Deputies. On the Ile de la Cité is the Palace of Justice, where the law courts are held, it is famous for its prison, the Conciergerie, within which Marie Antoinette, Robespierre and other famous personages of the Revolution were confined. North of the island is the Hotel de Ville (City Hall). Many other elegant public buildings, including the palaces, schools, hospitals and charitable institutions, are located in different parts of the city.

Among the churches the chief is the Cathedral of Notre Dame, situated on the Ile de la Cité. The Madeleine, a modern structure, is a handsome imitation of a Greek temple, and within, it is gorgeously decorated. The Panthéon, in the form of a Greek cross, is another notable church. The Grand Opera House, which covers nearly three acres of ground, is a magnificent structure that cost about \$5,500,000. The chief educational institution is the University of Paris. In the vicinity of the Sorbonne, which was the name of the building occupied by the old University of France, are the College of France, the Schools of Medicine and Law, the Observatory, the Ecole Polytechnic and the Jardin des Plantes. The Bibliotheque Nationale (National Library) contains about 2,600,000 volumes, besides surpassingly great collections of manuscripts, coins and historic relics of various kinds. The art collections of Paris are the pride of France and have been gathered from all parts of Europe. No city surpasses Paris in the value and interest of these collections.

In the parks and public places of Paris are many fine monuments of various kinds. Besides the statuary which has been erected in memory of famous Frenchmen, there are several very pretentious and remarkable monuments that deserve special mention. In the Place de l'Etoile is the largest triumphal arch in existence. As it is located on a slight eminence, it is visible from almost every part of Paris. In the center of the Place Vendôme rises a column 142 feet high, built in imitation of Trajan's column at Rome. On it are represented memorable scenes of the wars of 1805, down to the Battle of Austerlitz. At the top is a statue of Napoleon in his imperial robes. The granite obelisk in the center of the Place de la Concorde once stood in front of

the gateway to the great Temple of Luxor, in Upper Egypt. In 1831 this was presented to Louis Philippe by Mohammed Ali, then viceroy of Egypt. The monolith, thickly inscribed with hieroglyphics that tell of the exploits of Rameses II, is reddish granite, from the quarries of Assuan, and is seventy-six feet high. It rests on a pedestal of French granite thirteen feet high. The location of the Bastille, the famous old prison which was destroyed in the Revolution, is marked by a bronze column resting on a base which makes the whole monument 154 feet in height.

Government. Paris is under the national government, and its chief executive is the prefect of the Seine, appointed by the government. A town council, of which there are eighty members, four from each of the twenty wards of districts of the city, is chosen by the people. Each of the twenty districts, or *arrondissements*, has a mayor and two assistant councilors and is to a certain extent an independent organization, as it assesses and collects its own taxes and administers most of its ordinary affairs, subject, however, to the control of the municipal council. The city is well regulated and policed, and its streets are kept marvelously neat and clean. Many of the public utilities are owned and operated by the city. The tendency is toward municipal ownership of all Paris has an excellent school system, which provides for the education of its children from the time they are infants until they have passed through high school and are ready for entrance to university or college. Attendance is not compulsory in all schools, but a certain amount of education is required of every child. The control of so many public enterprises and utilities makes the annual expenses enormous.

Commerce and Industry. Paris has some large manufacturing establishments, and more are coming into existence, but its chief importance has been in the great number of comparatively small factories or workshops, in which small and elegant articles of all kinds are made in the choicest manner. No other city in the world equals Paris in the excellence and varied character of its objects of art and luxury—perfumes, gloves, artificial flowers, toys, jewelry, botanical and surgical instruments and a host of articles that a luxury-loving world enjoys. Paris is the commercial metropolis of France and has an enormous trade in manufactured articles.

with the rest of the world Its stores, many of which are large and on the department plan, are filled with choice articles, which are bought not only by Parisians but by visitors from all over the world, for Paris is and long has been the center of tourist travel from everywhere

History A village of the Gauls was located on the present site of Paris as early as the time of Julius Caesar, for he mentions it in his *Commentaries* About A D 250 Saint Denis introduced Christianity among the Gauls, and by the fourth century the name *Paris* had taken the place of *Lutetia*, the name of the village before that time It was not until the sixth century that Paris was chosen by Clovis as the seat of his government After the tenth century, when Hugh Capet chose it as the capital of the French monarchy, Paris continued steadily to grow in influence and importance Many of the kings of France contributed to the embellishment of the city, building bridges and quays and establishing palaces and buildings for the treasures of art and literature The numerous revolutions which marred its progress resulted in the destruction of some notable buildings, but, in spite of all, the city never appeared to go backwards, and even the destructive revolutions appeared to lend themselves to improvements, convenience and beauty The occupation of Paris by the Germans in 1871 was a great blow to the pride of the French, but after the evacuation, Paris rapidly regained its influence as the capital of cosmopolitan Europe

In 1914 the Germans reached Lagny, only seventeen miles from Paris, before they were driven back in the Battle of the Marne The second Marne battle, fought in 1918, saved the city again, and it was soon relieved of all peril of capture The terrible bombardment from the long-range gun caused considerable damage, but the finest buildings and monuments were protected by sand bags and other barricades The sittings of the peace conference were held in the city in the Ministry of Foreign Affairs, across the Seine from the Place de la Concorde, but the final treaty was signed in the suburb of Versailles, in the same room in which William I was crowned first emperor of Germany

Related Articles Consult the following titles for additional information
 Arch of Triumph Champs Elysees
 Bastille Notre Dame, Cathedral
 Bibliotheque Nationale of

Eiffel Tower
 Louvre
 Salon, The Paris
 Seine

Versailles
 Versailles, Palace of
 World War

PARIS, LOUIS ALBERT PHILIPPE D'ORLEANS, Count of (1838-1894), son of the duke of New Orleans and grandson of Louis Philippe His father died in 1842, and he thus became heir apparent to the throne During the American Civil War of 1861, he volunteered in the Northern army and served for some time on the staff of General McClellan Returning to France he became a member of the National Assembly, but the Expulsion Act of 1886 compelled him to leave France He died in England

PARIS, TEX, the county seat of Lamar County, 100 miles northeast of Dallas, on the Gulf, Colorado & Santa Fe, the Southern Pacific, the Frisco, the Texas & Pacific and the Paris & Mount Pleasant railroads The city is in a rich farming region, producing cotton, corn, oats and alfalfa It contains cotton-seed oil mills and oil refineries, a furniture factory, brick works and other enterprises The city has a fine Federal building, a hospital, a county courthouse, a sanitarium and a country club, and an auditorium The airport is Legion Field The place was settled in 1841 Population, 1930, 15,649

PARIS, TREATIES OF The name given to the important treaties of peace concluded at Paris

Treaty of 1763, the treaty signed on February 10 by France and Spain on the one side and England and Portugal on the other, at the close of the Seven Years' War (which see) By its terms Canada, Prince Edward Island, Cape Breton and French territory (except New Orleans) east of the Mississippi were ceded to England France retained a share in the fisheries of New Foundland and the Saint Lawrence, and possession of two small islands The English claim to Nova Scotia was confirmed and Britain's supremacy in India was established France ceded New Orleans and all the country west of the Mississippi to Spain, and Spain gave Florida to England The effect of the treaty was to strengthen England at the expense of France and make it supreme in America, in India and on the sea

Treaty of 1783, the treaty which came at the close of the American Revolution According to this treaty, which was signed on September 3 by Franklin, Jay and Adams, the United States was recognized for the first

time as an independent nation, with territory extending from the Atlantic to the Mississippi, and from the Gulf of Mexico to the forty-fifth parallel. The fishing rights of the United States also were recognized.

Treaty of 1814, signed on May 30, after the first abdication of Napoleon, by representatives of France, on the one hand, and of all the European powers opposed to him, on the other. By this treaty France lost all conquered territory except a small part on its northern and eastern frontiers, but regained most of its colonies. Holland was restored to the House of Orange, and of the conquered colonial possessions Ceylon, the Cape of Good Hope and part of Guiana were retained by England. The independence of Switzerland was confirmed, and Italy and Germany were recognized as aggregations of independent states.

Treaty of 1815, concluded on November 20 after the defeat of Napoleon at Waterloo, between France and the European allies. It modified the treaty of 1814, by divesting France of the frontier territory gained by the preceding treaty, and it placed upon France an indemnity of \$200,000,000.

Treaty of 1856, signed March 30 by the great Powers at the close of the Crimean War. It opened the Black Sea to merchant craft of every nation and closed it to all war vessels. The Danube was placed in control of an international commission and declared open to all navigation. The independence of Turkey was recognized, and the Russian protectorate over Wallachia and Moldavia was withdrawn.

Treaty of 1898, signed December 10, terminating the Spanish-American War. Spain evacuated Cuba and ceded to the United States the Philippine Islands, Guam and Porto Rico, and received in return \$20,000,000.

Treaty of 1919. Preliminaries respecting peace after the World War were arranged in Paris, but the formal meetings between allied and American representations and enemy delegates occurred in Versailles. See VERSAILLES, TREATY OF.

PARIS, UNIVERSITY OF, one of the oldest and largest universities in the world, located in Paris. It had its origin in a number of schools which became prominent during the twelfth century. Because of a serious conflict which arose between the students and citizens in 1229, a large number of students

emigrated to Oxford, but two years later the old differences were settled through the influence of Pope Gregory IX, and most of the students returned. From this time on the university rapidly gained in influence. It attained its highest development during the fourteenth and fifteenth centuries, when it was the educational center of Europe and of the Christian world as well. Its decline was due to the establishment of schools of theology in other parts of Europe and to the political dissensions which culminated in the French Revolution. During this struggle the institution was overthrown, but it was reorganized by Napoleon in 1808.

The present organization includes the faculties of law, medicine, Protestant theology, science, letters and pharmacy. The faculties of science and letters are established at the Sorbonne (which see). The average student enrollment in recent years is over 20,000. There are nearly 1,000,000 books and manuscripts in the university libraries.

PARIS GREEN, a very poisonous green powder made from arsenic acid and copper acetate. It is chiefly used for killing animal pests injurious to plants. The powder can be sprayed on plants dry or mixed with water. It does not dissolve in water, and must be kept in suspension by constant stirring.

PARKER, ALTON BROOKS (1852-1926), an American lawyer, jurist and politician, born at Cortland, N. Y., educated at the public schools, the Cortland Academy, Cortland Normal School and the Albany Law School, and admitted to the bar in Kingston, N. Y. He became justice of the New York supreme court in 1885, and four years later a member of the court of appeals. In 1898 he was raised to the position of chief justice of that court. In 1904 he was the Democratic nominee for President of the United States, but was defeated by Theodore Roosevelt, and he returned to the practice of law. In 1913 he acted as chief counsel for the plaintiff in the impeachment case of Governor Sulzer.

PARKER, FRANCIS WAYLAND (1837-1902), an American educator, born at Bedford, N. H. He was educated there and also studied at the University of Berlin. Returning to America, he taught for a time, and fought in the Union army in the Civil War, rising to the rank of colonel. In 1886 he was made principal of the Cook County (Illinois) Normal School (after 1896 the Chi-

cago Normal School) Three years afterward he became president of the Chicago Institute (a school founded by Mrs. Emmons Blaine), remaining there until his death. Colonel Parker was one of the leaders in the advanced educational movement in the United States. He was opposed to all formalism in teaching and was an advocate of what he termed a natural method. He was the author of *Talks on Teaching*, *How to Study Geography* and *Talks on Pedagogy*.

PARKER, GILBERT, Sir (1862-1932), a Canadian novelist and politician, was born at Belleville, Ont., and educated at Trinity College, Toronto. In 1886 he went to Australia and became one of the editors of the *Sydney Morning Herald*. In the early nineties he began to make a reputation as a writer of romantic fiction. By far the best of his novels are those in which he deals with the history and life of the French-Canadians; it is on his Canadian stories, such as *Pierre and His People*, *The Trail of the Sword*, *An Adventurer of the North* and *The Right of Way* that his literary reputation rests. His principal later books are *World in the Crucible*, *Donovan Pasha*, *The Weavers*, *Northern Lights*, *The Battle of the Strong and Wild Youth* (1919). In 1896 he removed to London, and in 1900 he was elected to the British House of Commons, soon becoming a leader in the Unionist party.



GILBERT PARKER

PARKERSBURG, W. VA., the county seat of Wood County, about 100 miles southwest of Wheeling, on the Ohio River, at the mouth of the Little Kanawha, and on the Baltimore & Ohio Railroad. The city is in a fertile agricultural region and has a considerable trade. There are also oil and gas wells, coal mines, clay beds and several medicinal springs. The various industrial establishments include steel making, tool works, porcelain manufacture and lumber mills. There are over eighty factories. The city is regularly laid out from the water's edge of both rivers. A railroad bridge, one and one-third miles long, crosses the Ohio, and the city has a park, a Carnegie Library, and three hospitals. Some of the prominent structures are De LaSalle Heights school, a Federal build-

ing, a courthouse and a city hall. Near the city is the island where Harman Blennerhassett once lived (see **BLANNERHASSETT, HARMAN**). Parkersburg was settled in 1773 and was chartered as a city in 1863. The commission form of government is in operation. Population, 1920, 20,039, in 1930, 29,623, a gain of 47.7 per cent.

PARKMAN, FRANCIS (1823-1893), an American historian, born in Boston and graduated at Harvard in 1844. Determining to write an account of the struggle between France and Great Britain for dominion in North America, he went west to experience pioneer life and to study the Indians. The hardships he endured injured his health, yet in spite of this and defective sight, Parkman worked his way to recognition as an authority on the period of the rise and fall of French dominion in America. He paid five visits to France to examine archives for his purpose. Among his books are *California and the Oregon Trail*, *The Conspiracy of Pontiac*, *France and England in the New World*, *The Jesuits in North America*, *LaSalle and the Discovery of the Great West*, *The Old Régime in Canada*, *Count Frontenac and New France under Louis XIV.*, *A Half Century of Conflict and Montcalm and Wolfe*.



FRANCIS PARKMAN

PARKS, NATIONAL, reservations set apart by national governments because of great scenic beauty or other features that make them of interest to the general public and worthy of being protected. The United States and Canada are the only nations which have created such parks on a large scale. Both of these countries control thousands of square miles of land characterized by magnificent scenery or covered with splendid forests that should be preserved from exploitation. These areas are described in the subheads below.

Parks of the United States. Up to July 1, 1930, the government of the United States had created twenty-two National parks, under supervision of the Secretary of the Interior. They are as follows:

Acadia National Park, created in September, 1918, was the first national park established in the Eastern United States. This park is the mountainous island of Mount Desert, off the southern coast of Maine, forming part of Hancock County. On it is the famous resort of Bar Harbor. The park is appropriately named, the name being of Indian origin, and apparently describing the region. The island is fourteen miles long and seven wide, and is noted for its combination of mountain, lake and ocean scenery.

Bryce Canyon National Park, created in September, 1928, is located in southern Utah. It is 3 miles long and 2 miles wide, principally an immense amphitheater cut in the top of a plateau, filled with an endless variety of shapes and forms carved by the forces of erosion, brilliantly colored.

Carlsbad Caverns National Park, in southeastern New Mexico, contains the largest series of underground caverns yet explored. It has lofty chambers and connecting corridors with limestone decorations of remarkable beauty. One chamber is nearly 4,000 feet long, with a maximum width of 300 feet.

Crater Lake National Park, in the Cascade Range, Klamath County, Ore., is a reservation of 159,360 acres. In the center of the park is an extinct volcano, the crater of which is the bed of a lake six miles long and four miles wide. On all sides of this beautiful sheet of bluest water, towering walls rise steeply to a maximum height of 2,000 feet. The surface of the lake is 6,177 feet above the sea.

General Grant National Park, of 2,580 acres, is in Fresno and Tulare counties, Calif. It is near Sequoia Park and has the same combination of forest and mountain scenery, the chief point of interest being the giant sequoia, General Grant Tree.

Glacier National Park. See article under that heading.

Grand Canyon National Park, in north-central Arizona, containing 958 square miles. The greatest example of erosion and the most sublime spectacle in the world. The Colorado River winds through it for more than 100 miles.

Grand Teton National Park, is located in Wyoming, about 11 miles south of Yellowstone Park. It covers 150 square miles, mostly of towering peaks of the Teton Mountain group, the Grand Teton being 13,747 feet high, and others rising above 12,000 feet.

Great Smoky Mountains National Park, in North Carolina and Tennessee, to be developed as a national park when at least 427,000 acres have been donated to the United States. Part already acquired is protected by the National Park Service.

Hawaii National Park consists of reserves on two islands of the Hawaiian group—Hawaii and Maui. On the former are Mauna Loa, the largest active volcano on the globe, and Mauna Kea, a burnt-out volcano, the highest peak in the Pacific Islands. On Maui is a wonderful extinct crater known as Halea-

kala. Hawaii National Park was authorized August 1, 1916. It contains 74,935 acres.

Hot Springs National Park, the first national park created. It is a tract of land in Garland County, Ark., covering 912 acres. The present boundaries were fixed in 1880, but the reserve was set aside by legislation in 1932. On the reservation there are forty-six hot springs, the waters of which are piped to a score of bathhouses. A hospital for soldiers and sailors is operated here by the War Department. The reservation is near Little Rock, and is coextensive with the city of Hot Springs.

Lassen Volcanic National Park, containing the only active volcano in the United States proper, is in California, in the southern end of the Cascade Range. The park was created in August, 1916, and contains 82,830 acres. Features of interest, besides the volcano, include hot springs, mud geysers, ice caves, canyons and forests.

Mesa Verde National Park, in the extreme southwestern part of Colorado, is interesting because of its prehistoric relics, particularly ruins of the Cliff Dwellers. It was established in 1906, and covers 42,376 acres. The name Mesa Verde means green table, the park lies on a tablelike plateau of picturesque beauty.

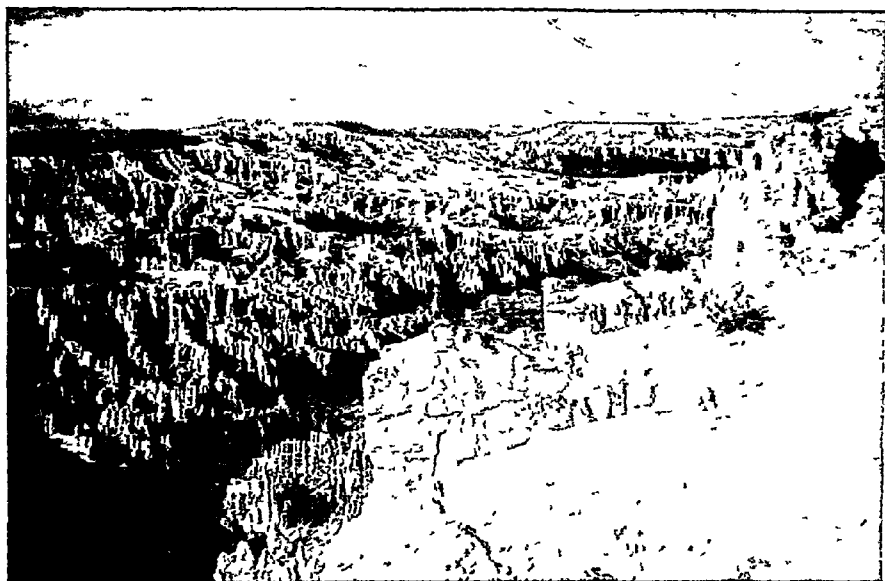
Mount McKinley National Park, a reserve of 2,200 square miles in the south-central part of Alaska, containing the gigantic Mount McKinley, the loftiest peak in North America. The park is a region of wild and picturesque aspect, characterized by forests, glaciers, lakes and mountains. It is to be kept a reserve for wild animal life.

Mount Rainier National Park, named for the noble mountain between Seattle and Tacoma, Wash., was established in 1899. It covers 207,360 acres, and is remarkable for the great glacial system that branches in all directions from Mount Rainier. This is the largest glacial system in the United States having a single peak as its center. There are acres of beautiful wild flowers about the mountain, the fields of which approach close to the ice barrier.

Platt National Park, covering 848 acres, is a tract in Murray County, Okla., established as a national park in 1906. It is noted for its many sulphur springs, which have medicinal value.

Rocky Mountain National Park, in Grand, Boulder and Larimer counties, Colo., is one of the most accessible and best known of the great national reservations. The 230,000 acres of superb mountain scenery were created as a national park in 1915. The park contains Longs Peak and part of the main range of the Rockies, and on its eastern edge it is 8,000 feet in altitude.

Sequoia National Park, containing the famous "Big Trees" of California, is a tract of 160,000 acres in Tulare County. Besides the forest of giant sequoias, one may see here magnificent mountain scenery, and on the eastern side of the park lofty Mount Whitney, the highest peak in the United States.



Courtesy National Park Service

BRYCE CANYON NATIONAL PARK, UTAH

Above Cathedral-like masses caused by erosion

Below Looking northward from Bryce Point



Courtesy National Park Service

GRAND TETON NATIONAL PARK, WYOMING

Above "A Rest from the Dusty Trails"

Below The Teton Range from the shores of Jackson Lake

Wind Cave National Park, created in 1903, consists of a canyon and a cave system in the Black Hills region of South Dakota. It is twelve miles from Hot Springs.

Yellowstone National Park. See article under that heading.

Yosemite National Park. See Yosemite National Park and Valley.

Zion National Park, created in 1919, in southwestern Utah has an area of 120 square miles. It contains Zion Canyon, a magnificent gorge of from 800 to 2,000 feet in depth, with precipitous walls, of great beauty and scenic interest.

Parks of Canada. The national parks of Canada are administered by a branch of the Department of the Interior. They are as follows:

Banff Park, in Western Alberta, on the east slope of the Rocky Mountains, containing Lake Louise and many other scenic attractions. Wild deer, goat, sheep and elk abound. It was established in 1885 and contains 2,585 square miles. It is in the Canadian Pacific.

Waterton Lakes Park, in Southern Alberta, adjoining Glacier Park in Montana. Renowned for mountain and lake scenery and plentiful game. It was established in 1885 and contains 220 square miles.

Jasper Park, in Western Alberta, on the east slope of the Rockies. It is a great mountain wilderness, with glaciers, canyons and many lakes, a big game sanctuary. Authorized in 1907, it has 4,200 square miles.

Yoho Park, in Eastern British Columbia, on west slope of the Rockies. It has rugged mountain and forest scenery, waterfalls and lakes. Established in 1886, it has 507 square miles.

Glacier Park, in Southeastern British Columbia, on the Selkirk range. It contains the Illecillewaet and Asulkan glaciers, Nakimu caves and Marion Lake. Established in 1886, it contains 521 square miles.

Mount Revelstoke Park, in Southern British Columbia, has large icefields, lakes and winter sports. Established in 1914, it covers 195 square miles.

Kootenay Park, in Southeastern British Columbia, opened in 1920, contains 587 square miles. Sinclair Canyon, Radium Hot Springs are points of interest.

Riding Mountain Park, in Southwestern Manitoba, west of Lake Winnipeg. Natural home of big game, large herd of wild elk. Established in 1929, with 1,148 square miles.

Prince Albert Park, in Central Saskatchewan. It has many lakes and streams, also big game. Opened in 1927, 1,869 square miles.

St. Lawrence Islands Park, Ontario, in the St. Lawrence east of Lake Ontario. Thirteen islands, recreation area.

Point Pelee Park, in Southern Ontario, on Lake Erie. A bird sanctuary, and summer resort. Established in 1918, 3,850 acres.

Georgian Bay Islands Park, in Georgian Bay.

Twenty-nine islands, set apart in 1929, varied plant and bird life, summer resort.

Buffalo Park, in Eastern Alberta, near Wainwright. Established in 1908, it is a fenced enclosure of over 197 square miles, the home of government buffalo herd of 6,000, also of many deer, elk, moose and other big game.

Wood Buffalo Park, in the Great Slave Lake Country, on the borders of Alberta and Mackenzie District. Established in 1922, with area of 17,300 square miles, it is the largest wild animal preserve in North America. Thousands of buffalo, caribou, moose, deer, musk-ox, etc.

Elk Island Park, in Central Alberta, near Lamont. A fenced enclosure of 51 square miles as a game preserve, with large herds of buffalo, moose, elk and deer.

Nekikam Park, in Southern Alberta, a fenced reserve of nine square miles as an antelope preserve. Established in 1922.

Wawwaskany Park, in Southeastern Alberta, an antelope preserve, established in 1922.

Mentawavak Park, Saskatchewan, an antelope preserve of 17 square miles.

PARLEMENT, *pahr'le man'*, the name assumed by a number of local bodies in France prior to the Revolution. The most important was the Parlement of Paris, which was the result of a long evolution from a body which originated in the times of the earliest Frankish kings. There were others at many of the leading cities. The functions of the parlement were chiefly judicial, though they had a sort of legislative and administrative power, as well. Parlements became the center of opposition to the ruling kings and were especially influential in the reigns of Louis XI and Louis XIV. Louis XV abolished the Parlement of Paris and constituted a new and somewhat different body, but the old organization was revived under Louis XVI. The Parlement of Paris and the local parlements were all abolished by the National Assembly in 1790. Their historical importance lies in their influence upon later judiciary tribunals in France and throughout the world. They did much to summarize and unify the common law, and, in dispensing justice, were notably free from prejudice and party influence.

PARLIAMENT, *pahr'li ment*, a word most closely associated with the legislative branch of a government, particularly with those of Great Britain and its dependencies.

In Great Britain the Parliament is composed of two houses, the House of Lords and the House of Commons. The membership of the former comprises *lords temporal*, that is, the hereditary peers and others elevated

from time to time by the Crown, and the *lords spiritual*, or clergy of the established Church. The House of Commons consists of representatives chosen by all the people, and is quite like the House of Representatives in the United States Congress. The House of Lords is in some respects like the American Senate. The authority of Parliament extends in a direct manner over Great Britain, and in lesser degree over the overseas dominions. The subject is further discussed under the title GREAT BRITAIN, subhead *Government*.

The Dominion Parliament. The British North America Act (which see) declares that the legislative department shall be called the Parliament of Canada, and that this Parliament shall consist of a Senate and a House of Commons. In this respect the framers of the constitution patterned after the English government where the law-making department consists of two houses, the House of Lords and the House of Commons. The theory of the bi-cameral (that is, "two chambers" or houses) system is this: if there were only one House it might pass some harmful legislation, either through haste, popular excitement, or under influence of powerful forces, if there were a second House acting



FIRST PARLIAMENT BUILDINGS,
TORONTO, 1796-1813

with the first, it would be improbable that the same influences should exist in both, and one House would doubtless correct the influence of the other. Then, too, if one House were in some sense higher grade than the other, its restrictive influence inevitably would be the greater.

The Senate. The Senate was originally composed of seventy-two members, twenty-four each from the three great divisions of Canada—the maritime provinces, Ontario and Quebec—with the hope of affording special protection to their representative interests. Since 1867 the entrance of other provinces has made necessary readjustments of the number from each division, so that the

total membership is now ninety-six. The senators are appointed by the Governor-General, with the advice and recommendation of the Privy Council (the official title of the Cabinet). Thus it happens, as in Great Britain, that the political party in control nominates the members of the Upper House. The fact that they are independent of the vote of the people at large is supposed to render them free from local influence. A Senator must be thirty years of age, and have real and personal property worth \$4,000 above his liabilities in the province for which he is appointed. The appointment is for life. In legislation the Senate has the same powers as the House of Commons, except in regard to bills imposing taxes or appropriating money. Financial measures must originate in the lower house, and the Senate cannot amend them.

House of Commons. The real political power rests in the House of Commons, elected by manhood suffrage. No Ministry can remain in office without its support and confidence. The British North America Act provides that the province of Quebec must have a fixed representation of sixty-five members, and each of the other provinces has a number bearing the same proportion to its population as sixty-five is to the population of Quebec. The population of Quebec in 1931 was 2,874,255, by dividing this total by 65, we find that the province has one representative for 44,185 inhabitants. The population of any province divided by 44,185 gives the number of representatives in the House. The basis of representation is changed after each decennial census. The total number of representatives under the 1931 apportionment is 245.

No property qualification is required for membership. A member must be a British subject by birth or naturalization, and must be of legal age.

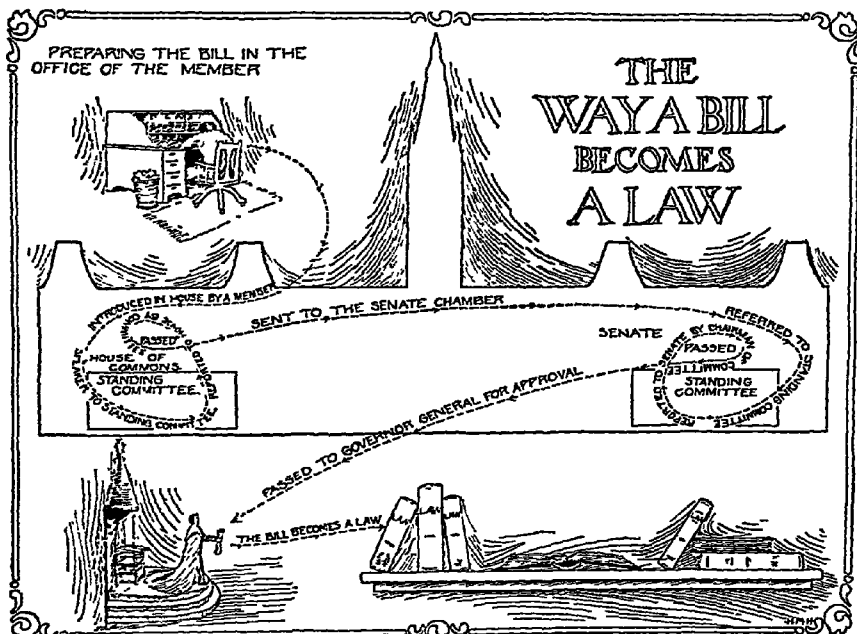
All members of Parliament receive an allowance of \$4,000 if the session exceeds thirty days in length, and an additional ten cents per mile for traveling expenses. The recognized leader of the opposition in the House of Commons, in addition to his seasonal allowance, receives a salary of \$10,000 a year.

Officers of Parliament. Each House of Parliament must have an officer to preside over its deliberations, this officer is the *speaker*. The term "speaker" derives directly

from the English system of government, and the name of this officer could not be changed, except by amendment of the Constitution. The speaker of the Senate is appointed by the Governor-General, the speaker of the House of Commons is elected by the members, he is assisted by the deputy-speaker, also elected, who presides in the absence of the speaker or in case of a vacancy. In each House there is a clerk or chief officer (appointed by the Governor-General in council) under whose direction a large number of clerks write the journals, attend committees, translate the public documents, etc. All debates are reported by an official body of reporters. French or English may be used in addressing either House, and both must be used in all

from any one province may represent every part of the province, the provinces have been divided into electoral districts as nearly equal in population as possible. If the census shows that Alberta may send sixteen representatives (as at present), the province is divided into sixteen districts or "constituencies," each of which is entitled to one representative. It is not necessary by law that a man so chosen be a resident of the district, but in practice the voters prefer a man who resides in the district to a man who lives several hundred miles away and knows nothing of local conditions.

How Elections Are Held General elections are held on the same day throughout the Dominion, except in several large and



the laws and records. The sergeant-at-arms has charge of the messengers and pages, and looks after the furniture of the House and offices. The Senate also has a "gentleman usher of the black rod," who summons the Commons to meet the Governor-General in the senate chamber at the beginning or end of the session.

Electoral Districts In order that the Members of the House of Commons chosen

remote districts, such as Yale and Cambo in British Columbia, where the returning officers fix the day so that all voters may have a reasonable chance to vote. When a general election has been decided on at a Cabinet meeting, the Premier so advises the Governor-General and Parliament is then dissolved by a proclamation in the name of the king, who alone has the power to summon, prorogue or dissolve it. A second proclama-

POWERS OF PARLIAMENT AND OF THE PROVINCES

The constitution definitely prescribes what powers are granted to the provincial governments. It also enumerates some of the more important powers of the Dominion Parliament as well as those powers that are prohibited or in whose use Parliament is restricted.

The following outline explains the three divisions

1 Powers of the Provinces

- (1) The amendment, from time to time, notwithstanding anything in the British North America Act, of the constitution of the province
- (2) Direct taxation within the provinces to raise revenue
- (3) Borrowing of money on the credit of the province
- (4) The establishment of provincial offices
- (5) The establishment and maintenance of reform and penal institutions, as well as hospitals, asylums and charitable institutions
- (6) Control of their municipal institutions
- (7) All licenses controlled by each province
- (8) Control of public local works
- (9) Guarantee of property and civil rights in the provinces
- (10) Administration of justice
- (11) Authority over matters of a local or private nature
- (12) Education
- (13) Marriage and divorce

2 Powers of Parliament Extend to

- (1) Public debt and property
- (2) Regulation of trade and commerce
- (3) Raising of money by any system of taxation
- (4) Postal service
- (5) Census and statistics
- (6) Military and naval service and defence
- (7) Navigation and shipping
- (8) Sea-coast and inland fisheries
- (9) Currency, coinage and banking
- (10) Weights and measures
- (11) Patents and copyrights
- (12) Bankruptcy and insolvency
- (13) Indians and Indian lands
- (14) Criminal law and penitentiaries

3 Powers Prohibited or Restricted

- (1) Appropriation of money or taxation except on the recommendation of the Governor-General
- (2) Treaties with foreign nations

tion authorizes the writs of election or order to each district officer, announcing the date for nomination of candidates. As a general rule the election takes place on the seventh day after nomination. If the party in control is returned to power, no changes are necessary in the officers of Parliament, in the cabinet or in the character of legislation. If the opposition wins at the election the system of a responsible Ministry necessitates the resignation of the existing Cabinet and the formation of a new Cabinet by the victors. General elections must be held at least once in five years, but they may be held oftener at the discretion of the Governor-General in council. A by-election is one in which a seat, which has become vacant for some reason, must be filled. A by-election may be important as registering changes in popular opinion or as forecasting the result of the next general election, ordinarily, however, it is only of local interest.

How a Bill Becomes a Law. A formal statement of a proposed law or act is called a "bill," and under this name is introduced into the Senate or House of Commons. Bills may originate in either House, except that financial measures of every kind must come from the House of Commons and the Senate cannot amend them. To become a law a bill must pass both Houses of Parliament and be approved by the Governor-General as the representative of the king. The voting is by yeas and nays, those in favor saying yea, those opposed, nay. If the vote is close, a roll-call or *division* is taken. After being passed by Parliament and approved by the Governor-General the bill is called an act.

Committees of Parliament. A great many thousand bills are introduced into Parliament at each session and it is manifestly impossible for the Houses in open session to give consideration to even a very small portion of them. Standing committees are therefore named in each House whose duty it is to give particular consideration to such proposed legislation as shall be referred to them. For instance, a bill proposing that certain changes be made in the banking laws would be sent in each House to the committee on banking. After a committee has given a bill due consideration, it reports to the House in regular session the result of its deliberations and either suggests that the House pass the bill, or that it be not passed. The recommendation of a committee is usually

accepted, although this is not the invariable rule.

In addition to the standing committees, select or special committees are appointed to consider private bills and such bills as do not fall within the province of the standing committees. All bills must be read three times in each House, as well as considered in the committee of the whole. After a bill has passed one House and goes into the other, the second House may amend it should it so desire (except that the Senate may not amend financial bills), in this case the bill must be returned in its amended form to the House in which it originated. Each House must agree to amendments proposed by the other House. If the two Houses cannot agree as to the final form of a bill, the bill is dropped for the session.

The Budget The most important power of the House of Commons is the control of financial affairs. The committee of supply, at the beginning of the session, brings a message from the Governor-General with the estimates of the sums required for the government for the next financial year, from the 31st of March to the next 1st of April. These estimates contain the expenditures for the current and the previous year in parallel columns and it is the duty of the minister responsible for expenditures for his department to give full explanations if they are demanded in the House. When the estimates have been formally laid before the House it is the duty of the Minister of Finance to make his financial statement, that is to present the *budget*. This familiar word is an old French word for "bag", in making his statement the Minister opens the money bag, shows how it should be filled and what should be done with the contents. The debate that follows the delivery of the Minister's speech is sure to be one of the most important of the session. The committee of supply continues to recommend expenditures, when these have all been adopted by the House, the committee of ways and means reports a supply or appropriation bill which is a formal ratification of the work of the committees and shows how the money for the appropriations shall be raised and spent.

PARLIAMENTARY LAW, the system of rules by which deliberative bodies are organized and conducted. The purpose of these rules is to facilitate the transaction of business and to secure the free and orderly dis-

cussion of questions. This is the day of organizations, and every person should possess such a knowledge of parliamentary law as will enable him to discharge in an acceptable manner the duties of any office to which he may be chosen in the organization of which he is a member. Moreover, a knowledge of parliamentary law is essential to success in public life.

The fundamental principles of parliamentary law are universal in their application, and we find the business of all organized bodies transacted along practically the same lines of procedure. In addition to these fundamental principles, however, each organization has its own rules and regulations, which constitute its constitution and by-laws.

The constitution usually states the purposes of the organization, fixes the qualifications for membership, specifies the number and duties of the officers and fixes the time of regular meetings.

The by-laws state the order of business, include directions for transacting the business of the organization, fix the dues of members, and specify how bills of the organization shall be paid.

Organizing a Society. The customary method of organizing a society is for those interested to call a preliminary meeting. It is proper for anyone to call this first meeting to order and preside until a temporary chairman is elected. The temporary chairman should call for the election of a temporary secretary. When this has been done a temporary organization has been completed.

The next step is to make the organization permanent. This necessitates the formation and adoption of a constitution and by-laws, and the election of permanent officers. Possibly some members may have prepared a constitution to be submitted at this first meeting. If so, and the constitution is adopted, the permanent organization may be completed at once. If this has not been done, however, a committee on constitution and by-laws and a committee on nominations should be appointed. The meeting should then adjourn to a specified date, when these committees should report. The adoption of these reports will complete the organization. All members present should sign the constitution after its adoption, and other members should sign as they join.

Officers The officers necessary for every organization are a president, a vice-president,

a secretary and a treasurer. In small organizations the officers of secretary and treasurer may be combined in one person. The term of office and manner of election of these officers are fixed by the constitution.

The President. It is the duty of the president to preside at all meetings, and see that they are conducted in accordance with the principles of parliamentary law, and the requirements of the constitution and by-laws. He should sign all minutes of the meetings after they have been approved, and perform such other duties as the constitution and by-laws may require.

The vice-president discharges the duties of the president in his absence.

In discussing his opinions or rulings, the president should refer to himself as the *Chair* or as *Your President*.

The Secretary. The secretary should keep a record of all the meetings of the organization, be the custodian of all records, reports and other documents and carry on all correspondence of the organization, unless there is a corresponding secretary.

The Treasurer. It is the duty of the treasurer to receive and keep all funds, belonging to the organization, and to pay bills when they have been approved. He should, from time to time, make a report to the organization stating what money he has received and the sources from which it is derived, and also report on the expenditures, stating the purposes for which they were made.

Conducting a Meeting. At every regular meeting of the organization the order of business given in the by-laws should be followed. In most organizations this order is as follows:

1. Reading and approving minutes of the last meeting
2. Reports of standing (or regular) committees
3. Reports of special committees
4. Unfinished business (not completed at last meeting)
5. New business

Motions. Success in conducting a meeting depends upon a thorough knowledge of motions and their order of precedence by the presiding officer. All business should be brought before the meeting by a motion or a resolution. Any member desiring to introduce a matter should rise in his seat and address the president as "Mr. President" or "Madam President," as the case may be. The president should then recognize the member

by speaking his name. The member then makes the necessary motion, which should be seconded by some other member and then repeated by the president. The second can be made without the member's rising from his seat or addressing the president. After the motion has been seconded and restated by the president, it becomes "the question before the house" and constitutes the business of the meeting until it is disposed of. The question is open for discussion, and may be debated at length. If there is no debate, the motion is voted on at once and disposed of.

Classification of Motions. The question before the meeting constitutes the principal motion or the *main question*, but it may be modified by other motions in the form of amendments, or set aside for other business before being finally disposed of. Motions affecting the main question are called *subsidiary motions*, and take precedence over the main question. That is, when one of these motions is made it must be disposed of before consideration of the main question can be continued. These motions are:

- To amend
- To lay the question on the table *
- To take a recess *
- Questions of privilege *
- The previous question *
- To postpone to a definite time
- To postpone indefinitely *
- To commit (refer to a committee)
- To adjourn *

Those marked * are not debatable.

In disposing of these questions the presiding officer should have them voted upon in the reverse order in which they are made until the main question is again reached.

Illustration of Precedence. Suppose, for instance, that in a literary society A has made a motion that the secretary purchase a book in which to keep the records of the society, at an expense not to exceed \$3.00. B moves to amend the motion by limiting the expense to \$1.50. C, wishing to introduce another item of business, moves to lay the question on the table. D, anxious to get home early, moves to adjourn. There are now five motions before the house. It is obvious that if the motion to adjourn carries, all the other motions are disposed of, therefore that motion should be voted on first (a motion to adjourn takes precedence of all other motions). If the motion to adjourn is voted down, the motion to lay the question on the table is voted on next.

If that fails the amendment is voted on. If the amendment carries, the main question as amended is reached. If the amendment fails, the main question as originally offered is voted on.

The *previous question* is a motion to stop debate, and means that discussion ceases and the main question is to be voted on at once. It is seldom used except in legislative bodies. When used in small organizations it should require a two-thirds vote to carry it.

Supervision, or Rules. Most by-laws provide that any, or all, of the by-laws may be suspended for any meeting by a vote of two-thirds of the members present. This provision enables the organization to dispense with its regular routine of business for the purpose of devoting the time of the meeting to other matters of importance.

Points of Order. When a member has "obtained the floor," that is, has been given the right to speak, he should be allowed to proceed without interruption unless he violates the rules of debate or wanders from the question under discussion. Should any member feel that the speaker is out of order he may rise in his seat and say, "I rise to a point of order." He should then state his point and be seated. The speaker should also be seated until the point is decided by the president. Should the speaker feel that the decision is unjust he and one other member may appeal to the house. In stating the appeal, the presiding officer should say, "In the judgment of the house should the decision of the Chair be sustained?"

A good manual of parliamentary law is Robert's Rules of Order.

PARNASSUS, the ancient name of a picturesque mountain in Phocis, Greece. This mountain, to-day called Lakeri, terminates in twin peaks, which reach a height of 8,000 feet, and which, except in summer, are crowned with snow. Among the ancient Greeks it was held sacred to Apollo and the Muses, Dionysus and Pan. There were two especially-consecrated spots on the mountain, one was the Castalian fountain, a sparkling spring, still flowing, which was anciently supposed to give poetic inspiration to those who drank from it, the other was Delphi, the seat of the famous oracle.

PARNELL, CHARLES STEWART (1846-1891), an Irish statesman and one of Ireland's foremost champions of Home Rule. He was born at Avondale, Ireland, and was

educated at Cambridge. Becoming a member of Parliament for Meath in 1875, he organized the active Home Rule party and developed its obstruction tactics. In 1879 he formally adopted the policy of the newly-formed Land League, of which he was chosen president, and after 1880 was the virtual head of the Irish party in Parliament. In the session of 1881 so vigorous was his agitation against the Crimes Act and the Land Act that, under the terms of the former, he was imprisoned for six months.

At the general election of 1885 Parnell was reelected for Cork, and in the next year he and his followers supported the Home Rule proposals introduced by Mr. Gladstone, while he also brought in a bill for the relief of Irish tenants. In 1887 he and other members of his party were accused by the *London Times* of complicity with the crimes and outrages committed by the extreme section of the Irish Nationalist party. To investigate this charge, a commission was appointed by the government, which acquitted Parnell of all the graver charges. Shortly after this, he became involved in a scandal with Mrs. O'Shea, wife of one of his supporters, and lost the influence and the leadership of his party. He died three months after his marriage to Mrs. O'Shea. He was the author of a number of books, including *An Historical Apology for the Irish Catholics*, *Treatise on the Corn Trade and Agriculture and On Financial Reform*.

PAROCHIAL SCHOOLS, *pa-ro'ki-al*, elementary schools which are supported and controlled by religious denominations. Each school is intended to provide instruction for the children of the district or church parish within which it is located, such instruction including both secular and religious teaching. Although the Lutherans maintain a parochial school system, the Roman Catholic organization is by far the more highly developed. The bishop is the head of all the schools in his diocese and he is assisted in their management by a board of priests or diocesan superintendents, whose duties are much like those of public-school superintendents. Within recent years the system has been developed to give high-school instruction.

PAR'ODY, a humorous imitation of any serious writing, either prose or poetry. Parody in verse differs from burlesque and from travesty in that it deals with an entirely different subject from the poem imitated and

resembles it only in form and expression. Lewis Carroll included several clever parodies in his two *Alice* books, and imitations of this nature are a favorite form of humorous writing by many minor poets. The following stanza is typical of this form of poetry:

Mary had a little wheel,
Its tires were filled with air,
It went wherever Mary went,
And she went everywhere

PAROLE, *pa roh'l*, derived from the Latin word meaning *speech*, a term signifying a verbal agreement, as distinguished from written contracts. A prisoner released on parole is one who is given his conditional freedom on his making certain promises as to future conduct.

In military usage a parole is a pledge which a prisoner of war makes to his captors not to take up arms against them if released. If the prisoner is recaptured and found to have violated his pledge he is put to death. The word also means a watchword or countersign. In law a parole is a pledge given for the release of a prisoner.

PARRAKEET, *par' a keet*, a bird of brilliant plumage belonging to the parrot family and distinguished from the parrot by its small size and long tail feathers. One species, the *ring parakeet*, is common in the East Indies, especially in Ceylon. It is a beautiful bird, about the size of a pigeon, and is green, with a red collar mark. It is very docile and quite a good talker. An allied species, the *rose parakeet*, is distinguished by the rose-red black-edged collar of the male. In Australia and Tasmania is found a species that is dark green above and yellow below, which lives and nests on the ground, making only occasional short flights. Another Australian species, the *zebra parakeet*, is a favorite cage bird. It is yellow above, green below, marked on the cheeks with blue and black spots, and on the back with cross bars of black. The brown wings are touched with green. One group of African parakeets, because of their demonstrations of affection, are called love birds. The *Carolina parakeet*, a species once common in the United States, has been almost exterminated. It is now occasionally seen in wild parts of Florida and the lower Mississippi Valley.

PARRISH, MAXFIELD (1870-), one of the foremost of American artists, noted as a painter, decorator and illustrator. He was born at Philadelphia, was graduated from

Haverford College, and studied art at the Philadelphia Academy of Fine Arts and at Drexel Institute. In 1897 one of his designs won a prize offered by the *Century Magazine* for a cover, and since then his decorative posters and colored magazine covers have been in demand. His work is characterized by delicate humor, originality and exquisite color. He is most successful when handling a subject that allows free play of imagination. His illustrations for children's books are incomparable in inventiveness and rich, glowing color. His most beautiful illustrations have been made for Field's *Poems of Childhood*, Mrs. Wharton's *Italian Gardens*, Irving's *Knickerbocker History of New York*, and *Mother Goose in Prose*. As a mural decorator he has achieved notable success. The "Old King Cole" design, on a wall of the Knickerbocker Hotel, New York, and decorations in hotels in Chicago and San Francisco are representative.

PARROT, a name given to about 600 species of tropical climbing birds found chiefly in Australia, the Malay Peninsula and Central and South America. All have short, stout, hooked bills, strong legs and peculiarly shaped feet—double webbed front and double rear toes—especially adapted to the birds' manner of life. In climbing, the birds frequently use their bills and balance themselves with their long, broad tails. Nearly all parrots have brilliant plumage—not always with colors artistically combined—and loud, harsh voices. They live in large communities and feed upon plantains, apples, papaws, grains, buds and nuts, occasionally insects, and, unlike other birds, manipulate their food with their feet. The average age of parrots is sixty years, though some birds in captivity have been known to live ninety years. This is one of the few animals below man to whom the gift of speech is vouchsafed, but as the bird has not the sense to use it intelligently, it is a questionable blessing.



PARROT

PARRY SOUND, Ont., the county town of Parry Sound County and the seat of the Parry Sound judicial district. Two great railway systems, the Canadian National and the Canadian Pacific, beside the steam-

ers of the Northern Steamship Company, furnish excellent transportation facilities. There are saw mills, veneer, boat, sash and door factories and machine shops, smelter and chemical works, manufactures of charcoal, spools and buttons. It is a central point for camping parties. Population, 1931, 3,512.

PARSEES, or **PARSIS**, *phar'sees*, the name given in India to the present-day followers of Zoroaster, settled chiefly in Bombay and Surat and the vicinity. The name is derived from the Persian province of Pars, where they originated, and from which they were driven in the seventh century by Mohammedans. The Parsees venerate fire as the symbol of their god Ahurâ-Mazda (Ormuzd), to whom they have dedicated fire temples, on the altars of which the sacred flame is kept continually burning. The Parsees are successful merchants, who, through their honesty and integrity, have won the respect of Europeans. Their religious beliefs have been modified by Hindu influences, though they still observe rigidly some of their old practices. They never intermarry with those of another sect and never eat food prepared by one of a different creed. One of their most curious customs is their method of burying their dead (see **TOWERS OF SILENCE**). The number of Parsees in India at the present time is about 90,000.

PARSIFAL, a solemn music drama by Richard Wagner, founded on a thirteenth-century epic poem by Wolfram von Eschenbach. Wagner wrote the words of his drama in 1877 and composed the music five years later. The story, briefly, is as follows: The Cup (Holy Grail) from which Christ drank at the last supper, and the Lance with which his side was pierced as he hung on the cross, were brought by celestial messengers to Titirel, chief of the Knights Templars, for safe keeping. This knight built a castle on Monsalvat, a remote peak of the Pyrenees, to shelter the sacred relics, and gathered together a band of knights to guard them.

An evil character named Klingsor, who had been refused membership in the brotherhood, became its bitter enemy, and near the castle he created a magic garden and in it put enchantresses to ruin the knights. When through his devices the castle was reduced to a state of utmost degradation and humiliation, Parsifal, a guileless youth, came to Monsalvat and learned the story of the Grail and of the curse. By virtue of his moral

strength he resisted the seductions of the garden and restored the castle and the knights to their original state of purity.

PAR'SLEY, a plant first known in Sardinia, but grown extensively throughout the world for two centuries. One species, the common parsley, is a well-known garden vegetable, the leaves of which are used for seasoning and for the purpose of decorating table dishes.

PAR'SNIP, a plant native to Europe and Asia, now extensively cultivated in all countries for its edible root. This root is long, white and tapering, about the size and shape of a carrot root. It has not the commercial or the food value of carrots, but is an important garden vegetable. In the latitude of New York the seeds are sown in April, covered with half an inch of soil, and the plants are thinned out, a six-inch space being left between the plants. The tubers are improved by frost, and may be left in the ground until December. The tops are sometimes used as fodder for cattle.

PAR'SONS, KAN., in Labette County, 137 miles southwest of Kansas City, on the Neosho River and on six lines of the Missouri, Kansas & Texas, and one branch of the Frisco lines. There is an airport. A large state hospital for epileptics is located here, and other prominent buildings are a Y M C A building, the railroad depot, a Masome Temple and a Carnegie Library. Glenwood and Forrest are fine parks. There are extensive natural gas wells in the vicinity, and sandstone and limestone quarries in operation. The city has shops and general offices of the Missouri, Kansas & Texas railroad, flour and grist mills, elevators, live-stock yards, a foundry, a creamery, and shirt and mattress factories. The place was laid out and incorporated in 1871. The commission form of government is in operation. Population, 1920, 16,028, in 1930, 14,903, a decrease of 75 per cent.

PARTHENON, a celebrated Greek temple, built in the time of Pericles, in the golden age of Greece. It was erected on the Acropolis at Athens and was dedicated to Athena, the patron deity of the Athenians. It is the finest example of ancient architecture, and, although it has not escaped the scars left by wars and time, the noble lines and exquisite proportions even of its ruins bear witness to what was once the most nearly perfect building ever constructed.

The temple is built in the Doric style, of white marble, and the ground dimensions are 228 by 101 feet. Originally it had eight thirty-four-foot columns at each end and seventeen columns on each side. The top of the pediment was sixty-four feet high. Above the columns a frieze extending around the entire exterior of the building bore colored relief sculpture representing the chief events in the great religious festivals of the Greeks, in the legendary life of Athena and in the history of Greece. The interior was divided into two rooms, one of which contained Phidias' celebrated gold and ivory statue of Athena.

In the Middle Ages the Parthenon served intermittently as a Christian church and as a mosque. In 1687 it was rendered unfit for religious uses by an explosion of gun powder which the Turks had placed in it when Athens was besieged by the Venetians. The more valuable pieces of sculpture have become part of various collections. In 1929 a partial restoration of the building was begun. See ELGIN MARBLES.

PARTICIPLE, *pah'ti-sip'l*, in English grammar a form of the verb which partakes also of the nature of an adjective or a noun. As a verb it may take an object or a complement, or be modified by an adverb. At the same time it may be used as an adjective to modify another word, or as a noun serve as the subject, complement or object of a verb. There are three tenses of the participle: present, past, perfect. These forms occur in both active and passive voices of transitive verbs, as illustrated by the following forms of the verb *receive*. Present active, *receiving*; present passive *being received*. Past active, *received*, past passive, *received*. Perfect active, *having received*, perfect passive, *having been received*. The three participial forms of the verb *to be*, an intransitive verb, are *being*, *been*, *having been*.

Uses of the Participle. The following sentence contains a present participle used as an adjective: "Pirates *sailing* the Spanish Main are characters in this thrilling story." *Sailing* is derived from the verb *sail*. It is used as an adjective to modify *pirates*, but shows its verbal nature in taking a direct object, *Main*. Note that *thrilling* also ends in *ing*. It is not, however, a participle, as it is not a verb-form nor has it any other use than that of a pure adjective.

Uses of the noun participle as the (a) subject, the (b) object and the (c) complement of a verb, and as the (d) object of a preposition are illustrated in the following type sentences:

- (a) *Fighting* evil is helping good.
- (b) He chose *voting* as the best measure of reform.
- (c) *Helping* in (a) is used as a complement.
- (d) In *exercising* the muscles we become stronger.

Some grammarians prefer to call the noun verbal ending in *ing* a *gerund*, limiting the term *participle* to verbals used only as adjectives. The term *infinitive in ing* is also used by some.

The participle is used in independent constructions, as in the following: "That being my story, I ask you to overlook the offense."

PARTINGTON, MRS. See SHILLABER, BENJAMIN PENHALLOW.

PARTNERSHIP, the association of two or more persons, for the purpose of undertaking and prosecuting conjointly any business, occupation or calling for gain. Partnerships may be formed in three ways—(1) by written contract, (2) by oral agreement, (3) by implication, that is, by acts leading others reasonably to believe that a partnership exists. The duration of the partnership may be limited by the contract or agreement, or it may be left indefinite, subject to be dissolved by mutual consent, or by withdrawal of one member. It may also be dissolved by a court for various reasons.

Partners are *real* when they are directly engaged in the conduct of the business. A *silent*, or *dormant*, partner is one who invests capital in the firm, but does not take any active part in its management. The powers of partners are very extensive, and the contract or other act of any member of the partnership in matters relating to the joint concern, is, in point of law, the contract or act of the whole and consequently binding upon the whole, to the extent of rendering each liable for it individually, as well as through his interest in the partnership property. This rule holds, even though the acts of one partner are fraudulent in relation to the others.

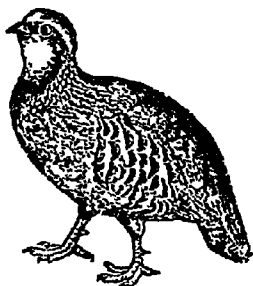
In a few states the partnership is recognized in law as an artificial person which can sue and be sued and declared bankrupt, but in nearly all jurisdictions suits at law

cannot be begun for or against the firm but must be in the name of the partners

A partnership may be limited to a particular transaction or branch of business, without comprehending all the adventures in which any one partner may embark, but such reservation must be specified in the contract. For in the usual course each member of a partnership is liable at common law for the debts of the firm, and a silent partner is responsible for all debts of the firm which have been contracted during his partnership.

Limited Partnership. A limited partnership is one in which one partner is responsible for all the debts of the firm, and the liability of the other partners is limited to their contribution to the capital of the firm. Limited partnerships are regulated by the laws of the state in which they exist, and most states require the word limited to be placed after the firm name, as Henry Damon & Co. (limited).

PARTRIDGE, a name somewhat loosely applied in America to a number of birds of the grouse family. In New England the ruffed grouse is called a partridge; in the Southern states the quail is called a partridge, and in Canada the Canada grouse is called the wood, cedar or spruce partridge (see Grouse). True partridges are found in the



PARTRIDGE

eastern hemisphere, and there are about 150 species. The common partridge is a handsome gray bird, with a dark chestnut horse-shoe mark on the breast and broad reddish bars on the sides and flank. It feeds on grain and other seeds, insects and such pupae as are chiefly found in cultivated grounds. Like the quail, and unlike the true grouse, the partridges live in pairs. Their nest, which is circular and lined with grass, is placed among reeds, in hedges or in stubble, often near a road and contains from nine to twenty eggs.

PARTRIDGE, WILLIAM ORDWAY (1861-1930), an American sculptor, also distinguished as an art critic and lecturer. He was born in Paris, was educated at Columbia University, New York City, and later studied

sculpture in Florence and Rome. He has executed a number of portrait busts, including those of Shakespeare, Milton, Byron, Tennyson, Burns, Poe and Markham. He has also made a fine bronze statue of Hamilton and an equestrian statue of General Grant, both of which are in Brooklyn. In 1894 he completed a fine statue of Shakespeare for Lincoln Park, Chicago. Partridge has written *Art for America, The Technique of Sculpture* and *Song Life of a Sculptor*.

PAS, MAN, formerly called **LE PAS** (*le pah'*), or **THE PAS**, a town on the Saskatchewan River at the southern end of the new Hudson Bay Railway, a division of the Canadian National. A branch railway line extends north 135 miles to the Flin Flon mining district. The chief industries are the manufacture of lumber, and smelting concentrates from the mines. Fish and game abound in the neighboring lakes and woods. Population, 1931, 4,030.

PASADENA, CALIF., a beautiful residential city and winter resort, situated in Los Angeles County, nine miles northeast of Los Angeles and twenty miles from the sea. The city has a beautiful location at the head of the San Gabriel Valley, near the base of the Sierra Madre Mountains. Nearby are Mount Lowe, a mile high and a favorite resort for tourists, and Mount Wilson, the site of the solar observatory of the Carnegie Institute at Washington. The surrounding country is largely devoted to the cultivation of oranges, lemons and other fruit.

The city is served by the Southern Pacific, the Santa Fé, and the Union Pacific railroads. Airports are at Glendale, six miles distant. The streets are broad, and well kept. Pasadena is a city of beautiful homes surrounded by lawns decorated with shade trees and flowers. Its magnificent hotels serve great numbers of visitors. Its Tournament of Roses is a New Year's Day event.

The most prominent buildings are the Federal building, the Public Library, the Auditorium, and Community Playhouse. Aside from the public schools the leading educational institution is the California Institute of Technology.

The city was settled in 1870 by people from Indianapolis, Ind., who planted the first orchards here. It was incorporated in 1886, and adopted the commission form of government in 1913. Population, 1920, 45,334, in 1930, 76,036.

PASCAL, *pa skah'*, BLAISE (1623-1662), a French philosopher and mathematician, born at Clermont, in Auvergne, and educated at Paris and Rouen. Equipped with the best scientific training possible in his day, and intensely interested in the development of science—to which he made valuable contribution—he held firmly to the belief that absolute truth is obtainable only through divine revelation. As a boy he was very precocious, writing a treatise on conic sections at the age of sixteen. In 1654 he joined the Jansenists and entered their convent at Port-Royal. From then onward scientific and religious interests equally occupied him. His writings include *Provincial Letters*, *Thoughts* and *Apology for the Christian Religion*. He is sometimes inaccurate, but a master of irony, and gifted with a graceful, witty and brilliant style.

Pascal's Law, in physics, a theorem discovered by Pascal. It has been stated as follows:

Pressure exerted anywhere upon the surface of a liquid enclosed in a vessel is transmitted undiminished in all directions, and acts with equal force upon all equal surfaces, and at right angles to the surfaces.

PASHA, *pa shah'*, an honorary title bestowed by the khedive of Egypt or the sultan of Turkey on high government officials, citizens in private life and even distinguished foreigners whom these rulers wish to honor. In the army it has three grades, depending on the rank of the officer bearing it—general-in-chief, general and brigadier. Admirals, civil officers of the rank of vizier and provincial governors are among others receiving it. The title always follows the name of the person, for example, Emin Pasha.

PASSAIC, N J, in Passaic County, twelve miles from New York City, on the Passaic River, at the head of navigation, and on the Lackawanna, the Erie and the New York, Susquehanna & Western railroads. It has a picturesque and healthful location, in the most fertile region of the state. Its city hall and other public buildings are fine structures, and it has several parks. The Reid Memorial Library is one of the finest structures in the city. There are rubber and woolen mills, dye and print works, brick-yards, chemical works, silk mills and other factories. In the vicinity are large vineyards, and considerable wine is manufac-

tured. The municipal water supply comes from above the falls, about four miles away. The place was settled about 1679, was incorporated as a village in 1869 and was chartered as a city in 1873. The commission form of government has been in operation for a quarter century. Population, 1910, 54,773, 1920, 63,824, in 1930, 62,959.

PASSENGER PIGEON. See **PIGEON**, subhead *Passenger Pigeon*.

PASSION, *pass'hun*, **FLOWER**, a large genus of plants, native mostly of the warm regions of America. They are all twining plants, often spreading over trees to a considerable length, and in many cases they are most beautiful objects, on account of their large, rich or gaily-colored flowers, which are succeeded by orange-colored edible fruits called *maypop*. They received their name from the early Spanish missionaries, who believed that they saw in the beautiful flowers emblems of the crucifixion of Christ. On account of their beauty, many of the species are cultivated in hothouses or even out of doors in mild climates. About ten species are natives of the United States.

PASSION PLAY, a dramatic performance enacted every ten years at Oberammergau, a little village in Bavaria. The play represents the passion and death of Christ, and is enacted by the villagers of the town. In 1633 the inhabitants of Oberammergau, as an act of gratitude because they had escaped a plague which was causing much desolation, vowed that they would perform every tenth year a play representing the passion of Christ. Ever since, the play has been performed regularly and has attracted visitors from all parts of the world. There are about six hundred performers, all villagers, who play their parts with religious fervor and reverence. The actors for the leading parts are chosen especially with regard to their own likeness to the characters they are to represent. Plays representing the passion of Christ were numerous in Germany as early as the thirteenth century.

PASS'OVER, a Jewish festival commemorating the providential escape of the Hebrews in Egypt, when God, smiting the first-born of the Egyptians, *passed over* the houses of the Israelites which were marked with the blood of the paschal lamb. It is celebrated on the first full moon of the spring, from the 14th to the 21st of Nisan, the first month of the sacred year. During the eight days of

the feast the Israelites were permitted to eat only unleavened bread, hence the Passover was also called the "feast of unleavened bread." At the service for the eve of the Passover, the history of the deliverance of the Jews is read by the head of the house, special dishes are prepared symbolizing the affliction and burdens of their forefathers in Egypt, and psalms and songs of thanksgiving are sung in praise of their miraculous deliverance.

PASSPORT, a certificate of citizenship granted by a government to the citizens who wish to travel in foreign countries. It certifies to the citizenship of the bearer, and requests for him a safe passage through the country, the protection of the laws, and such lawful aid as he may require. In the United States the Secretary of State is the only official authorized to issue passports. The application must be in the form of an affidavit declaring the citizenship of the applicant, and must be accompanied by a certificate from at least one witness that the statements made are true. It must be sworn to before some one authorized to administer oaths, and the applicant must take the oath of allegiance to the United States. A fee of ten dollars must accompany the application. A passport is good for two years from the date of issue, and may be renewed for five dollars.

Except in times of war, passports are granted as the right of any citizen applying for one, but they are unnecessary except in Russia, Turkey and the countries of the Far East. However, owing to the disturbed conditions in Europe during the World War and the period immediately following, the issuing of passports was greatly restricted in the United States. In Canada passports are issued by an under secretary of the London Foreign Office at Ottawa.

PASTEUR, *pas tur'*, Louis (1822-1895), a French chemist and biologist, born at Dôle, France, and educated at the University of Jena and at the Ecole Normale, Paris. In 1867 he became professor of chemistry at the Sorbonne, and in 1882 was chosen a member of the French Academy. Four years later, when the Pasteur Institute was established, he became director of that institution, an office he held the rest of his life. Pasteur was one of the leading scientists of the nineteenth century and the value of his work cannot be estimated. He has saved the lives of many children by his invention of the process

known as pasteurizing, to prevent fermentation of milk. He originated a method of checking hydrophobia by inoculation, and a treatment for animal cholera and anthrax. He saved France millions of dollars through his discoveries in connection with silk-worm diseases, and he accomplished as practical results in his researches regarding the diseased conditions affecting the drinkers of wine and beer. It is no exaggeration to say that the results of Pasteur's researches have been of great importance to every known branch of physical science.



LOUIS PASTEUR

PASTORAL POETRY, any poetry which treats of a subject in a rural setting. The loves of shepherds and shepherdesses and the antics of nymphs and satyrs frequently are its theme. The first European pastorals seem to have been the *Idyls of Theocritus*, written in the third century B. C. These are exquisite little pictures of rustic life, sometimes with a comic note, sometimes containing a dramatic episode. Later Vergil produced a similar genre in his *Eclogues*. Throughout Italy, France and Germany at a later period pastoral poetry flourished. The earliest English pastoral of note is Spenser's *Shepherd's Calendar*, written in 1579. In its wake followed a long procession of pastorals of varying form and merit. They include Marlowe's *Passionate Shepherd*, Sidney's *Arcadia* and Ben Jonson's *The Sad Shepherd*. There is a distinct line separating the pastoral and the later nature verse of such poets as Cowper, Burns, Shelley and Tennyson.

PATAGONIA, the name formerly applied to the extreme southern part of South America, lying between latitude 33° S and the Strait of Magellan. The region was discovered by Magellan in 1520. In 1881 it was divided between Argentina and Chile, the portion east of the Andes going to Argentina, and that west of the mountains to Chile. The name now has no geographical significance. Magallanes, formerly Punta Arenas, at the southern end of the Chilean portion, is the farthest south of any city in the world.

PATENT, in the ordinary meaning of the term, a grant by the government to an inventor or discoverer of a useful device or art, of the exclusive right to make, manufacture and sell his invention or discovery for a definite period. Patents were granted by the colonial and state governments, before the adoption of the Constitution, and that instrument (Art I, Clause 8) confers upon Congress the power to grant patents and copyrights. All patents are granted through the Patent Office, which is attached to the Department of Commerce, and in charge of the Commissioner of Patents.

How to Obtain a Patent. Applications for patents must be made to the Commissioner of Patents in accordance with prescribed rules. The application must contain a clear and concise description of the article, with the necessary drawings or models and must be accompanied with an application fee of \$30. The applicant must also file under oath a statement to the effect that he believes himself to be the inventor of the article. While any inventor may prepare and file his application, inventors not thoroughly conversant with the patent laws are advised to employ a registered patent attorney, since the value of the patent depends largely upon the accuracy and completeness of the specifications in the application.

When the application is received it is referred to a special examiner, whose duty it is to determine whether or not the article is novel and useful and whether it has been anticipated in the United States or foreign countries. If no objection is found, the patent is issued on payment of an additional fee of \$30. If objections arise, the applicant is given opportunity to amend his application so as to remove them, if such removal is possible.

Duration of a Patent. A patent is issued for seventeen years, it may not be renewed for a second period except under very unusual circumstances.

Number of Patents. The United States issues more patents than any other nation, patent No 1,000,000 was granted in 1911, No 2,000,000 was granted in 1935. The number of applications varies from 50,000 to 90,000 a year, and the patents granted range from 45,000 to 55,000.

PATENT LEATHER, formerly known as *japanned leather*, is leather prepared by a process which gives it a hard, shiny surface

like lacquer or enamel. Successive coats of lampblack mixed with linseed oil are put on the flesh side of the hide, each when dry being rubbed with pumice stone. The skins are then treated with a liquid black dye containing turpentine and allowed to stand for about a month. They are then baked in a moderately heated oven for three days. After this they are exposed to sunlight for about ten hours, and the process is then complete.

PATERSON, N. J., the county seat of Passaic County and the third city of the state in population. It is twelve miles north of Newark and seventeen miles northwest of New York City, on the Erie, the New York, Susquehanna & Western and the Delaware, Lackawanna & Western railroads.

The principal institutions and buildings are the museum, the Danforth Free Memorial Library, and a high school for girls on a seven-acre tract. There is also a state normal school.

Paterson produces over \$200,000,000 worth of manufactured goods in a year. These include silk products, airplane motors, brushes, brooms, cotton goods, furniture, meat products, lumber products, mill supplies, recording instruments, rubber goods, rugs, trunks and bags, undertaker supplies, wall paper and veneered panels. The manufactories number 325, employing over 10,000 workmen.

The city is the leading silk-manufacturing center in the United States. It carries on every silk process except the reeling of silk from the cocoon, producing all kinds of goods from the plainest lining to the most beautiful brocade.

The city was founded by Alexander Hamilton, the site was selected because of the power possibilities at the Passaic Falls. Silk was first manufactured in 1839 at the old Gun Mill, the building in which the first Colt revolver had been made about five years earlier. John P. Holland developed his modern submarine while a resident of Paterson prior to 1880. The city was named after Governor William Paterson, one of the framers of the Federal Constitution. Population, 1930, 138,513.

PATIENCE, *pa'shens*. See **SOLITAIRE**.

PATMOS, an island off the coast of Asia Minor, twenty miles south of Samos. Its length is about ten miles, its breadth, nearly six miles. The island is an irregular mass of barren rock, agricultural products are scanty, and the inhabitants are occupied

PATNA

2757

PAUL

chiefly with fishing. It is famous as the supposed place to which Saint John was exiled and where he wrote the Fourth Gospel. The island belongs to Italy. Population, about 4,000.

PATNA, BRITISH INDIA, is the capital of the province of Bihar and is situated on the banks of the Ganges, some 300 miles northwest of Calcutta. The Indian quarter, with its domed mosques and minarets, presents a striking appearance from the river bank, and is now being developed out of the congested and dirty city it once was. The high court and legislative chamber, the secretariat and other government offices have set an example followed elsewhere with alacrity since the town became the capital. By reason of its central position and natural advantages, the city is an important business center. Population, 1931, 159,690.

PATRIARCH, *pa'tre arh*, in Hebrew history, the father and head of a family or tribe, specifically Abraham, Isaac, Jacob and the rulers of the Twelve Tribes. The patriarchal office was hereditary. In the time of Christ the term was applied to the president of the Sanhedrin, the highest governmental body in Syria and Judea. In the early Christian Church the bishops of Rome, Constantinople, Antioch and Jerusalem were called patriarchs. The patriarch of Rome in time became the supreme pontiff of the Roman Catholic Church, with the title of Pope.

PATRICIAN, *pa'trish'an*, a word derived from the Latin *pater* (father), applied in ancient Rome to citizens whose forefathers were Romans, therefore persons of pure, unmixed blood and consequent social and political standing. This class was distinct from the plebeians, members of conquered tribes who had been brought to Rome, and their descendants.

PATRICK, SAINT (390-469), the patron saint of Ireland. It is believed that he was born near the site of what is now Dumbarton, Scotland. At the age of sixteen he was taken captive to Ireland, but after six years' escape. Feeling himself called to abolish paganism from the land of his captivity, he studied for the ministry, was consecrated bishop of Ireland, and began his missionary work there in 432. It is said that he founded 300 churches in the island and baptized more than 12,000 converts. Patrick left an autobiography which he called a *Con-*

fession, but it was more psychological than historic, and the known facts of his life are few. Legend says he drove the snakes out of Ireland, and that he worked miracles. "Saint Patrick's Day," the seventeenth of March, is celebrated by the Irish people throughout the world.

PATROONS OF HUSBANDRY. See **POLITICAL PARTIES IN THE UNITED STATES**. **PATROON SYSTEM**, the plan adopted by the Dutch West India Company for the colonization of New Netherlands, now New York state, by which any member of the company could gain possession of a tract of land sixteen miles long on any one side of a river or bay, establishing there within four years a colony consisting of fifty persons over fifteen years of age. The evil of this system was soon apparent, for the proprietor, or *patroon*, developed the power of a feudal lord, which resulted in a typical landed aristocracy. The system was gradually changed to remove its most objectionable features, although many of the estates thus created endured well into the nineteenth century. See **VAN RENSSELAER, STEPHEN**.

PATTI, *pa'tee*, ADELINA MARIA CLORINDA (1843-1919), one of the world's greatest sopranos. She was born in Madrid, Spain, of an Italian father and Spanish mother, and emigrated to America when very young. Her first instruction in music was received from her brother-in-law, Maurice Strakosch, and her first stage appearance was made in New York in the opera *Lucia*, when she was sixteen years old. Two years later she made her London debut, and at once her rare gifts were recognized.

She sang in all the great European centers and attained almost incredible popularity. In 1868 she married Marquis de Caux, whom she divorced in 1883. Subsequently she married the tenor Nicolini, and a year after his death, in 1899, married Baron Ceders from In her last years she lived on her estate of Craig-y-Nos, in Wales. After 1911 Madame Patti did not make public concert tours.

PAUL, the name of five Popes of the Roman Catholic Church.



ADELINA PATTI

Paul I, Pope from 757 to 767, brother of Stephen II, was on good terms with Pippin and Charlemagne

Paul II, Pope from 1464 to 1471, caused a crusade to be preached against the Hussites

Paul III, Pope from 1534 to 1549, formerly Alessandro Farnese, was a zealous defender of the Church and did much to suppress heresy. Among the important events of his reign were the publication of a brief condemning slavery, the excommunication of Henry VIII of England, the approval of the Order of Jesuits and the convocation of the Council of Trent. He was a great patron of art and appointed Michelangelo architect in chief of the Vatican and Saint Peter's

Paul IV, Pope from 1555 to 1559, joined France in the war for the conquest of Naples (1555-1557)

Paul V, Pope from 1605 to 1621, laid an interdict on Venice and established the Congregation of the Oratory and of the Ursuline and Visitation

PAUL, SAINT (3-87), the first Christian missionary, called "the Apostle of the Gentiles." He was born in Tarsus, the chief city of Cilicia, of a prominent Hebrew family, and was called SAUL until the time of his conversion. He was educated at Jerusalem under Gamaliel, one of the most learned rabbis of the day. At an early age he became a member of the city governing body, and probably had something to do with the stoning of Stephen

Soon after this event he was commissioned by the high priest to persecute Christians. On the road to Damascus, whither he was bound to carry on this work, he experienced conversion (about A D 35). This event (see *Acts IX*) occurred when he was about thirty-two years old. Immediately he began to preach the Christian faith, and thus he incurred the wrath of the Jews. Compelled to flee Damascus, he retired into Arabia, where he remained about three years in obscurity. After this he returned to Damascus and Jerusalem and later went to Antioch and preached there

In A. D. 46 Paul set out with Barnabas on the first of his three missionary journeys, going from Antioch in Syria to Cyprus, thence to the cities of Pisidia in Asia Minor and returning to Antioch. On his second journey, made five years later, he traveled as far west as Macedonia, visiting Philippi, Thessalonica, Athens and other Greek cities, founding the first Christian churches in Europe. Paul's last missionary journey, begun in A D 54, took him to Ephesus. After this he went to Jerusalem. There he was saved

from an angry mob by the commander of the Roman garrison, who imprisoned him. At the end of two years, to escape trial at Jerusalem, he availed himself of his right as a Roman citizen and appealed to Caesar. Accordingly he was sent to Rome, where he spent two years more in imprisonment. There are later accounts of his work in Asia Minor and Greece. According to tradition he suffered martyrdom.

Paul's writings constitute a large part of the New Testament and include *First and Second Thessalonians, Galatians, First and Second Corinthians, Romans, Colossians, Philemon, Ephesians, Philippians, Titus and First and Second Timothy*

PAULISTS, an Order of Roman Catholic priests, more correctly called The Congregation of Missionary Priests of Saint Paul the Apostle. The Order was organized in 1858 at New York City by Rev. Isaac Thomas Hecker, for the purpose of spreading the Catholic faith among non-Catholics in the United States. New York is the center of Paulist activity, and the churches there belonging to the Order and also those in Chicago are famous for their boy choirs, the latter being second only to the Vatican choir.

PAUNCEFOTE, *pawns'fut*, JULIAN, Lord (1828-1902), an English statesman and diplomat, born at Munich, Germany, educated at Paris and Geneva. He was admitted to the bar in 1852. In 1866 he was appointed attorney-general at Hong Kong and acted as judge of the supreme court in 1869 and again in 1872. He was knighted in 1874, and two years later he became undersecretary of foreign affairs. In 1888 he was appointed as British minister at Washington, and in 1893 he was raised to the rank of ambassador. His greatest diplomatic success was the completion with Secretary Hay, of the treaty relating to the construction of a transisthmian canal. He always used his influence to promote a friendly feeling between the United States and Great Britain. See HAY, JOHN; HAY-PAUNCEFOTE TREATY

PAUPERISM. A pauper, before the law, is a person who is in such a state of poverty that he must depend upon public or private charity for support. The chief causes of poverty are intemperance, ill health, wastefulness and lack of employment. The problem of pauperism has perplexed society for centuries, but it is only in recent times that

systematic effort has been made to remedy the causes leading to it. During the Middle Ages pauperism was attended to chiefly by the Church, which taught that alms-giving and charity were essential means of grace, and churches of all denominations still give some attention to those in need of support. But the problem of pauperism became so general that it became necessary for the state to take charge of it. Each country has its own methods. In the United States the government units that look after paupers are the city and the county, except in a few of the New England states, where the township is the unit of local government. The great objection to this system of relief is that it does not try to remove the causes of poverty, one who becomes a pauper is likely to remain in that condition.

Bureaus of Charity. To remedy this defect in public charity, organizations have been formed in many large cities for the purpose of relieving immediate want and at the same time assisting the family or individual to become self-supporting. The chief purpose of these organizations is to do away with the causes of poverty. Every application for assistance is thoroughly investigated, and such aid as seems most likely to help the applicant to help himself is given. Moreover, the organization continues its friendly relations with those in need of assistance until they have become self-supporting. See CHARITY.

PAVEMENT, a floor or covering of stone, wood, brick or asphalt, laid on the ground so as to make a hard, smooth surface, fit for a roadway. Pavements were in use in ancient times, though their origin is obscure. The streets of Babylon are said to have been paved in 2000 B. C. According to Livy, Rome was paved as early as 170 B. C. and pavements of lava have been found in the excavations of the old Roman cities of Pompeii and Herculaneum. In the Middle Ages pavements were not common until the twelfth century, and from that time to the nineteenth century they were rudely constructed, large cobblestones being generally used. Of modern cities, Paris is said to have been the first paved, now at least a part of the streets in all cities of Europe and America have pavements.

Stone pavement is the most durable, and this is used often for streets carrying heavy traffic. Granite, which is the most suitable

stone, is made into rectangular blocks, which are laid on the narrow side, on a foundation of concrete, and are set close together in rows, across the street. Such pavements are very expensive and are gradually being supplanted by other durable materials.

Brick pavement is of bricks made especially for the purpose, being so hard-burned that they have a glassy appearance. They are laid on a foundation of sand, gravel or tarred planks, in a manner similar to that of the granite blocks in a stone pavement. This pavement wears unevenly, and is gradually being discarded.

Wooden Pavement. A wooden pavement made of round blocks about six inches long and so laid that the ends formed the surface was formerly quite popular, but it was soon found that the blocks wore unevenly and the pavement was not durable. A wood pavement of brick-shaped blocks filled with tar is now in use in many cities, cedar or yellow pine being the wood generally used. This pavement is smooth and noiseless, but is comparatively short-lived.

Asphalt Pavement. The foundation for asphalt pavement is usually of concrete. On this is laid a *binder*, which consists of small broken stones mixed with asphaltic cement. Upon this the wearing surface, which is a mixture of sand, Portland cement and asphalt mixed together at a high temperature, is spread. This makes a strong, noiseless and durable pavement, especially suited to automobiles, but not to heavy traffic.

Concrete Pavement. Portland-cement concrete, popularly known simply as *concrete*, is also used alone, to form the surface of roads. Concrete consists of an intimate mixture of crushed stone or gravel, sand, Portland cement and water. Mixed wet, the cement undergoes a chemical change as the mixture dries, which causes the concrete to become hard and strong. Properly built, concrete roads are suitable for the heaviest traffic. Steel rods or mesh are often imbedded in the concrete to supplement its natural strength.

PAWNBROKER, a person engaged in the business of lending small sums of money, usually at usurious rates of interest, who receives as security for the loan jewelry, clothing or other salable articles. If the person borrowing the money fails to repay the loan, together with the interest due at the time specified, the pawnbroker has the right to sell the article pawned. Much fraud has

been practiced in this business Dishonest pawnbrokers have been known to accept installment payments without crediting the amounts on their books, and again to sell articles left with them before the money borrowed was due. To-day legislation regulating pawnbroking has been enacted in every state and in Canada In several large cities there are large respectable pawnbroking establishments doing a legitimate business Some states have authorized state pawn shops, where the needy are accommodated at fair rates of interest

PAWNEE', a tribe of North American Indians who lived in the Platte River region of Nebraska. After ceding their holdings to the United States government, they settled on a reservation in the present state of Oklahoma, where there is now a remnant of the tribe numbering about 600 The Pawnee were agriculturists and in early days lived in houses made of earth and logs Their name, meaning *horn*, refers to their custom of wearing a hornlike scalping lock

PAWPAW. See **PAPAW**

PAWTUCKET, R I, in Providence County, four miles north of Providence, on the Blackstone River, at the head of navigation, and on the New York, New Haven & Hartford and several electric railroads In 1790 Samuel Slater first introduced into the United States at Pawtucket the manufacture of cotton goods, which is to-day the leading industry. Woolen and silk goods, leather, machinery, thread, twine, rope, hosiery, knit goods, rayon, electrical goods and paper are manufactured on a large scale Calico printing is also important The thread works are the largest in the country The city has five parks, the largest of which is Slater Park Other interesting features are Collyer Monument, a soldiers' monument, Memorial Hospital, a Home for the Aged Poor, an armory and several bridges The city has the Sayles Memorial Library The place was settled about 1654, and the town was incorporated as a city in 1885 Population, 1920, 64,248, in 1930, 77,149, a gain of 20 per cent

PAYNE, JOHN HOWARD (1791-1852), an American writer and actor, best known as the author of *Home Sweet Home* This famous song, the music of which is an old Italian melody, was first sung in his opera *Clari*, at London, in 1823 Payne was born and reared in New York At sixteen he was compelled

by family reverses to leave Union College, which he had attended two years, and support the family He turned to the theater, and his acting won for him instant recognition

He wrote a number of original plays and adapted many foreign plays to his uses Although he became popular throughout the United States and in England, he remained a poor man

In his later years he served twice as United States consul to Tunis, where he died In 1883 his body was brought back to his native land and interred at Washington.



JOHN HOWARD
PAYNE

PEA, a genus of plants belonging to the pulse family, native to Southeastern Europe and Southwestern Asia. The garden pea, one of the numerous species, is one of the most important of table vegetables, while the field pea is extensively grown as stock feed. Several species are extensively cultivated for their blossoms, which are almost unsurpassed for their pure and varied colors and delicate fragrance.

The garden pea may grow as a vine or as a dwarf It is a beautiful plant, crisp and light green It produces small white blossoms, which are followed by plump, oblong pods bearing the edible seeds There are two important varieties, one having smooth pods, the other bearing pods with wrinkled skin—the former usually a dwarf, the latter a climber Peas have a high food value and are among the most satisfactory vegetables for canning purposes

PEABODY EDUCATIONAL FUND, a fund bequeathed in 1867 by George Peabody for the purpose of aiding education of both whites and negroes in the South. The fund amounted to about \$3,500,000. In 1875 the trustees founded at Nashville, Tenn., a Normal School since known as Peabody Normal College This institution was broadened in 1909 and became George Peabody College for Teachers It is now the largest institution of its kind in the South, has about 115 teachers and an average enrollment of 875 The library contains 100,000 volumes

George Peabody (1795-1869), an American merchant and philanthropist. He served for a time in the War of 1812 and afterwards became head of a large dry-goods business, with branches in New York, Philadelphia and Baltimore. He founded the firm of George Peabody & Company in London and there spent his last years. His most important donation was made for the advancement of education in the South, though he gave large sums elsewhere to promote the arts and sciences.



GEORGE PEABODY

PEACE, BREACH OF THE Any person who disturbs public tranquility by taking part in a riot, affray or other disorderly demonstration commits a breach of the peace and is accountable to the law. A breach of the peace may be criminal or non-criminal. Criminal breaches of the peace include the riotous destruction of property and threat to kill, non-criminal breaches include brawls in public places, congregating in unlawful assemblies, tumultuous petitioning, spreading false news, and so on. The law provides each law-abiding citizen the right to live in peace, and any person found maliciously and persistently interfering with his enjoyment of it may be punished by fine or jail sentence, or both.

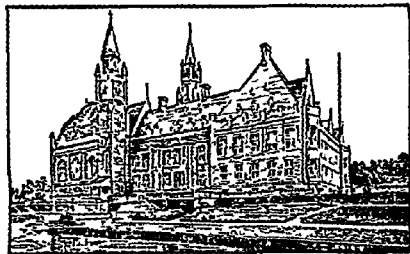
PEACE, LEAGUE TO ENFORCE. See LEAGUE TO ENFORCE PEACE.

PEACE CONFERENCE, INTERNATIONAL, a conference of the leading nations which has assembled at different times at The Hague, the ultimate purpose of which was to establish permanent peace throughout the world. The initiative in the movement was taken by Nicholas II, czar of Russia, in 1898, and the first conference met May 18, 1899.

The nations represented were the six great European powers and eight smaller European states, four Asiatic governments, China, Japan, Persia and Siam, and the United States and Mexico. The conference immediately appointed committees and sub-committees, who went into secret session to receive various propositions upon the particular line of work each was to consider. The general

conference met every few days to hear and discuss the reports of these committees. On the 29th of July the congress was brought to a close. The three great questions considered were—disarmament, more humane regulations in warfare, and mediation and arbitration.

In regard to disarmament the delegates contented themselves with a declaration of the desirability of an arrest in the increase of the armaments. They also signed resolutions referring the question of the rights of neutrals and private property and of bombardment to a future conference and urging a reduction in the military and naval budgets. The rest of their work consisted of three declarations, against (1) the use of balloons for dropping explosives, (2) the use of shells which gave forth deadly gases, (3) the use of bullets which expand when they strike the human body. The American and English delegates declined to sign the second and third clauses of this agreement. The powers, besides, signed three "conventions," one of which applied the humane provisions of the Geneva Convention to naval warfare. Another embodies a perfected code of the rules of war (see INTERNATIONAL LAW).



PEACE PALACE AT THE HAGUE

The convention making arbitration an international duty, and providing a permanent court of arbitration to sit at The Hague, was perhaps its greatest achievement. This convention also made it the duty of all governments to encourage the submission of disputes to the court, and provided for the elaboration of a complete code of arbitration procedure. This convention was in the form of a treaty and was ratified by the United States Senate February 5, 1900.

At a second conference, held in 1907, forty-five nations were represented. This conference adopted thirteen conventions intended

to strengthen the work of international arbitration. During the World War all principles and rules set forth at the Peace Conference were ruthlessly violated, but the war was not looked upon as a general relinquishment of these principles. The most far-sighted statesmen of all nations looked beyond the war to a permanent peace of the world which they hoped the war might bring about. See NATIONS, LEAGUE OF.

PEACE RIVER COUNTRY, the name usually applied to the valley of the Peace River in Alberta, Canada. The Peace River is formed in British Columbia, by the confluence of the Finlay and the Parsnip. From this point to the Slave River is a distance of a little over 800 miles. For the first 300 miles of this distance the river flows eastward, and the river valley is little more than a channel worn in the plateau, the land near the river being level or rolling. After the river turns northward, the banks become lower and the valley broadens. Here is a vast fertile country, capable of becoming the home of thousands of people.

Until recently the great drawback to the settlement of this region was lack of transportation facilities, but the construction of extensions of Canada's great railway system northward from Edmonton has now provided easier access to the valley. Wheat, oats, corn and all garden vegetables are successfully grown. The meadows are covered with a heavy growth of native grass that makes excellent hay. There is also plenty of timber for use of settlers, so the Peace River Country is rapidly developing into a desirable agricultural region.

PEACH, one of the most delicious fruits of temperate regions, closely allied to the plum and cherry, and in value second only to the apple among orchard products. A native of Persia, it is now grown more extensively in the United States than any other country, because of favorable conditions of soil and climate and the employment of up-to-date methods of cultivation. The average annual crop for the whole country is 45,500,000 bushels, California producing the largest amount. In Canada, too, the peach is an important product, especially in Ontario in the vicinity of the Great Lakes; the production in British Columbia is also increasing. The peach is the fruit of a small tree of the rose family, which rarely grows higher than twenty-five feet. It bears long,

Outline on the Peach

I. DESCRIPTION

- (1) Tree
 - (a) Size
 - (b) Shape
- (2) Leaves
- (3) Blossoms
- (4) Fruit
 - (a) Characteristics
 - (b) Kinds
 - (c) Shape
 - (d) Flavor
 - (e) Size

II. WHERE RAISED

- (1) North America
- (2) Europe
- (3) Asia

III. HARVESTING

- (1) Picking
- (2) Packing
- (3) Shipping

IV. PEACH DISEASES

V. USES

- (1) Food
 - (a) Raw
 - (b) Cooked
 - (c) Dried
 - (d) Canned

Questions on the Peach

- To what fruits is the peach allied?
 In what country is it most extensively cultivated?
 What kind of climate does it need?
 What kind of soil?
 Into what classes may peaches be divided?
 What is meant by "budding"?
 What is the average life of a peach tree?

slender leaves and delicate pink flowers, which appear in early spring.

Kinds of Peaches. Peaches are popularly divided into clingstone and freestone, but these two classes gradually merge into each other in the different varieties, and even the same variety may be clingstone or freestone in different seasons. There are nearly three hundred varieties of peaches grown in North America, which may be roughly grouped as follows:

- (1) Peen-to, a flat, medium sized, greenish-white, early peach, suitable for commercial culture only in the hot Gulf states.
- (2) South

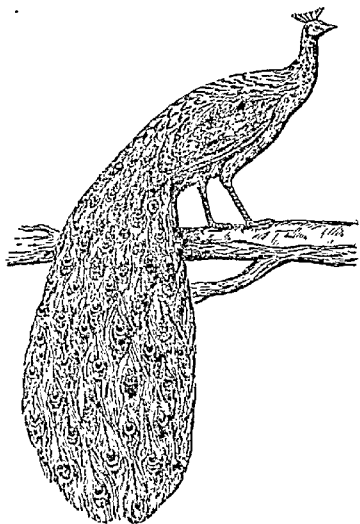
China, a rather small, oval fruit (3) Spanish or Indian, a late peach, nearly always yellow, with a hairy skin; (4) North China, a large, oval fruit; (5) The Persian, which includes the great majority of large, yellow or white fleshed varieties grown in the more northern latitudes. In addition, there are certain smooth-skinned peaches called "nectarines," which are really variations but may be cultivated like other varieties of the peach.

In America peaches are grown in orchards, like apples, but in Europe they are usually trained against walls or other protection and often kept under glass.

How Raised. Nurserymen, who supply stock to fruit growers, propagate the plants from seed. In spring the pits are planted six to eight inches apart in rows wide enough to allow cultivation with horses. In August or September the seedlings are budded (see GRAFTING) with the desired varieties, since the peach does not, as a rule, reproduce true to seed. In warmer climates the budding may be done earlier in the summer. In the North, trees budded one fall are allowed to grow the following season before transplanting to the permanent orchard. Peaches thrive best on light, sandy, gravelly soil, though larger trees will grow if heavier soils are used. High or rolling lands are desirable to insure good soil and air drainage, for the peach must be planted in protected localities free from late spring frosts. Occasionally the trees are thoroughly whitewashed in the fall or winter, because this has a tendency to delay blossoming; planting on a northern slope will sometimes have a similar tendency. In the permanent orchard the trees are set about twenty feet apart each way, though they may be set fifteen feet apart if careful attention is given to pruning and fertilizing. The peach is not a long-lived tree, even under the most favorable conditions, seldom living more than thirty years. The life of a commercial orchard is from seven to nine years; new trees should be added at various times as the old ones die out.

PEACOCK, the male peafowl, a handsome pheasant, having gorgeous iridescent plumage. He is about the size of a domestic turkey, but has a smaller head, which is crested. Unlike many brilliantly colored birds, the peacock's colors are harmoniously combined, green and deep blue predominating. The tail feathers are very long and are marked with eyelike spots. These the bird is able to spread erect into an enormous

fan. The hen is smaller than the cock, has no train and is soberly colored. The bird's raucous voice, probably developed for protection in the jungle, does not add to its at-



PEACOCK

tractiveness as pets. Peafowls are native to India, Ceylon, Burma, Malaysia and Java, from which countries they have been taken to all parts of the world. The young are not hardy, and are difficult to raise. See PHEASANT.

PEALE, *peel*, CHARLES WILSON (1741-1827), a famous American portrait painter. After studying under Copley, in Boston, and Benjamin West, in London, he settled in Philadelphia in 1774, where he painted numerous portraits of Revolutionary soldiers and statesmen, among them Nathanael Greene, Horatio Gates, Count de Rochambeau and Baron de Kalb. He executed fourteen portraits of Washington, the best two of which belong respectively to the National Gallery, Washington, D. C., and New York Metropolitan Museum of Art.

PEALE, REMBRANDT (1778-1860), an American portrait and historical painter, son of Charles Wilson Peale. He was an excellent draughtsman, but not so good a colorist as his father. His historical pieces include *The Roman Daughter*, *The Court of Death* and *The Ascent of Elijah*. A copy of a portrait he made at the age of eighteen

of Washington hangs in the National Capitol. Peale was one of the charter members of the New York Academy of Design and served for a time as president of the American Academy of Fine Arts.

PEANUT, or **GOO'BER**, a small vine belonging to the pea family, and the nut which it bears. The latter is extensively used as an article of food, and the plant, probably a native of Brazil, is widely cultivated in warm regions. The edible portion of the peanut is a rounded kernel borne in a pale yellowish,



PEANUT

wrinkled pod. There are one, two or three kernels to a pod, according to variety. A lumpy soil finely pulverized is considered best for peanut culture. In the spring, when danger of frost is past, the kernels are planted in hills about a foot and a half apart. Two or three kernels, with skins left on, are placed in each hill. The plant takes the form of a hairy stem with numerous branches, bearing small, single, yellow flowers much like those of the garden pea. When a flower falls, the stalk supporting the undeveloped pod lengthens, and bending downward, pushes the fruit into the ground, where it ripens. In the United States the annual crop amounts to more than a billion pounds, the most coming from Texas, Alabama, Georgia, North Carolina, Virginia and Florida.

Peanuts are roasted and eaten as a delicacy, and they form the basis of many of the mod-

ern health foods. An oil used in making salads and as an ingredient of soaps is expressed from the seeds.

PEAR, a favorite fruit belonging to the same family as the apple, the peach and the plum, but most closely resembling the apple. In form it is an irregular cone, with the base hanging downward; the center contains a core with seeds. When ripe, the pear is softer and more juicy than the apple, but the pulp has cells of wood fiber scattered through it. These cells form hard bunches, easily detected when the pear is eaten.

The pear tree resembles the apple tree, but it is smaller. Two varieties of trees are cultivated—the standard and the dwarf. The pear is propagated by budding and grafting. Dwarf trees are grown by grafting on quince as a stock (see **GRAFTING**). There are many varieties, but the favorites in the United States are the Bartlett, the Anjou, the Le Conte and the Kieffer. The pear is extensively cultivated in France, in the northern part of Italy and in the United States, where the annual crop amounts to from 3,000,000 to 9,000,000 bushels, valued at about \$8,000,000. California, New York, Michigan and New Jersey are the states producing the largest quantities. The fruit is picked while green and allowed to ripen slowly, otherwise it decays before fully ripe. Pears are eaten as they come from the tree, and are also canned and dried.



A pearl diver

P**EARL**, *perl*, a curious and beautiful product of certain mollusks. Nearly all shell-covered marine animals line their shells with a smooth satiny coating to protect their delicate bodies from contact with the otherwise rough covering. This substance exudes from the animal's body and is deposited on the wall of the shell in a series of milky films which harden, forming an iridescent coat known as *nacre*, or *mother-of-pearl*. It sometimes happens that

a grain of sand or minute marine animal or other foreign substance finds its way into the shell and irritates the sensitive body of the occupant. Unable to remove the intruder, the little mollusk covers it with layer upon

layer of this same nacreous lining material, and in this way forms the pearl that is so much valued as a gem.

Occasionally the mollusk is attacked by a parasite which bores through the shell. It then deposits its secretion in the form of a half sphere. Pearls formed in this manner are called *blister pearls*. The most valuable pearls are those which are detached from the shell and are of symmetrical shape, either spherical or pear-shaped. The greater the size of such pearls, the greater the value. The largest pearl yet discovered is in the Victoria and Albert Museum, London. It weighs three ounces.

Gem pearls are found chiefly in double, or bivalve, shells, the pearl oyster and giant clam being the chief producers, though valuable specimens have come from fresh-water mussels. The finest pearls are gathered in the East, the most valuable coming from the oysters of the Persian Gulf. Other celebrated pearl-oyster banks are off the coasts of Australia, the Sulu Archipelago, and Lower California. Gem pearls are occasionally found in single, or uni-valve, shells, though these are chiefly valuable for their nacreous lining. The exquisite pink conch shells of the West Indies are used for cameos and the abalone shells of the lower California coast yield a green nautilus used for inlay work.

Pearl oysters lie on the sea bottom at a depth of from fifty to one hundred feet, usually in channels between groups of islands, where there are strong currents. They are collected by divers working in crews. The oysters are gathered in shiploads and taken to land, where they are spread out to decompose. They are then washed and the pearls are easily separated.

The fresh-water pearl industry of the United States is large. Although seed pearls of value are found, the chief yield is *mother-of-pearl*, which is used for buttons, the handles of table implements and other like utensils. In Tennessee, Iowa, Kentucky and Wisconsin pearl is an important resource.

PEARY, pe'e-ry, ROBERT EDWIN (1856-1920), an American Arctic explorer, famed as the discoverer of the North Pole. He was born at Cresson, Pa., and was educated at Bowdoin College. In 1881 he became a civil engineer in the United States navy, and for four years was engaged in making surveys in connection with the projected Nicaragua Canal. He conducted Arctic expeditions in

1891, 1893, 1896 and 1897, published an account of these voyages, *Northward Over the Great Ice*, in 1898, and soon afterwards made another trip, reaching the highest point attained to that time. After a trip in 1905 he published his second volume, entitled *Nearer the Pole*. In 1908 he started out on the expedition which was to culminate in the supreme achievement of his career as an explorer—the discovery of the Pole, which he reached on April 6, 1909.



On his return to America Peary was formally thanked by Congress and promoted to the rank of rear-admiral. He has been honored in America and abroad, not only by geographic societies, but by the leading scientific bodies of the world. In May, 1917, Rear-admiral Peary was made chairman of the National Aerial Patrol Commission, but ill health forced him to retire before he became actively engaged.

PEASANTS' WAR, an insurrection of the peasants of Central and Southern Germany in 1524 and 1525. The trouble grew out of a long series of oppressions to which the feudal system had reduced the people, and was the culmination of disturbances that had been going on for fifty years. Aroused and emboldened by the revolutionary wave of the Reformation, the people finally arose, in June, 1524, and a bloody warfare ensued. The insurrection spread through Alsace, the Palatinate, Franconia, Bavaria, Tyrol and Carinthia. The most frightful cruelties were practiced by both nobles and people, thousands were murdered, castles, convents and other buildings were burned. The peasants had thought that Luther would aid their cause, but he wished to keep the religious movement free from political complications, and worked against, rather than for, the peasants. The rising was put down after nearly 100,000 persons had been put to death. The peasants were severely punished, and their condition after the uprising was worse than it had been before; in fact, it was not until the nineteenth century that their rights were recognized and their lot was made easier.

PEAT, a valuable fuel produced by the gradual decay of vegetable matter. Peat is often referred to as coal in the process of making. It is composed principally of dead mosses, but it often contains small twigs and even tree trunks that have fallen and have been kept from rotting. The mosses began to grow many centuries ago and continued branching and intermingling till they formed close-woven mats, which killed the lower parts of the stems. As the moss died below, it continued to grow above. These mosses thrive only in wet places, hence in the course of centuries the areas known as *peat bogs* have been formed.

In Europe extensive areas of peat occur in Russia, Scandinavia, France, Germany, Holland, Denmark, Austria and Ireland. In America the largest areas are found in the United States, Canada and Alaska. The workable peat bogs of Canada have an area of 37,000 square miles, and an average depth of five feet. The deposits in the United States are estimated to aggregate thirteen billion tons. The largest areas occur in the states bordering the Atlantic from New Jersey to Florida, and in the North Central states as far west as North Dakota.

When purified and dried peat is an excellent fuel, but the expense of preparing it has prevented its extensive use in the United States, where coal is abundant. In Ireland and some other European countries, however, it is in general use.

The simplest method of preparing it for fuel is to dig the peat from the bog and cut it into brick-shaped blocks, which are set up to dry. In some localities the peat is ground and purified from the earth and clay by washing. The prepared peat is then run into beds about four inches deep and allowed to dry partially, when it is cut into blocks about four inches square and twelve inches long. These are then stacked and allowed to become thoroughly dry. See **COAL, FUEL**.

PECAN, a species of hickory, growing in North America and cultivated especially in California and in the Southern states, for the nut. The nut is oblong and has a thin shell. The variety called the *paper shell pecan* has a very thin shell and is the most desirable. Ten years are required for trees to become profitable, though they begin to bear when five or six years old. The raising of pecans is a paying industry in the South. It is estimated that an orchard of twenty acres will

produce 10,400 pounds of nuts at the end of ten years. The pecan is now the most important commercial nut produced in the United States. See **HICKORY**.

PECCARY, an American wild hog, differing from the domestic hog in having no external toe on the hind feet, a short snout and tusks and only a rudimentary tail. There are several species. The common peccary is found in all warm parts of South America, in Mexico and the southwestern part of the United States. It is small, grayish and bristly, has a mane and a white collar. The white-lipped peccary, found in Guiana, Brazil, Paraguay and Peru, is larger and darker in color. The animals congregate in herds and are sometimes destructive to crops. They are fierce fighters, and a herd will stoutly defend one of its members if attacked. The flesh of the peccary is coarser than domestic pork.

PECOS, pa'kos, RIVER, a river of New Mexico and Texas, which rises in the Rocky Mountains in San Miguel County, N. M., flows in a southeasterly direction and, after a total course of about 800 miles, enters the Rio Grande. During the hottest weather there is but a slight flow.

PEDAGOGY, *ped'ago j*, the science of teaching, is a term derived from the Greek word *pedagogue*, meaning a *leader of children*. The Greek *pedagogue* was a slave who acted as the attendant and protector of a child. Later the Romans applied the term to the slave who taught the child Greek. From this the significance of the term was transferred to one who teaches. Until recently the term *pedagogy* was restricted in its application to the principles and theories of teaching, and the term *education* was applied to these theories and also to whatever measures and systems might be necessary to put them into practice. Recently, however, the term has been so expanded in its application that *pedagogy* is practically synonymous with the science of education.

Relation to other Subjects. The laws of psychology form the rules of teaching; consequently, pedagogy is a derived science and is based on psychology. For this reason the study of psychology should precede the study of pedagogy. Since the principles of teaching apply to all phases of instruction, pedagogy is also related more or less directly to all sciences found in courses of study. It relates to biology and physiology, in physical

education, to logic, mathematics and the natural sciences, in intellectual education, and to history, literature and ethics, in moral education

Fundamental Principles The science of pedagogy rests upon certain general principles that are now recognized by educators in all countries, though some of these were centuries in gaining universal recognition. Among the most important of these principles are

(a) **Relation of Mind and Body.** All educators recognize the intimate relation between mind and body. The brain and nervous system constitute the organism through which the mind acts and we become acquainted with the world about us through the special senses. The mind works better when the body is in a state of health. Defective sense organs are a hindrance to mental activity. Fatigue lessens mental activity, etc.

(b) **Development of the Mental Powers.** The various forms of mental activity develop with the growth of the body. For the order of this development see Psychology, subhead Development of the Mental Powers.

(c) **Attention.** Attention lies at the foundation of all knowledge. It is an act of will and depends upon interest. See Attention.

(d) **Self-Activity.** All knowledge is gained through the self-activity of the learner. The child must educate himself. The duty of the teacher and the parent is to point the way and to remove obstacles too difficult for him to surmount.

(e) **Order of Instruction.** The order of instruction should conform to the order of development of the mental powers. The order universally recognized is (1) observation before reason, (2) the concrete before the abstract, (3) the simple before the complex, (4) from the known to the unknown, (5) facts before definitions and principles, (6) processes before rules.

Modern Movements Modern systems of education and methods of instruction have been attained only through centuries of effort on the part of those interested in education and the general welfare of the race. The influence of early systems on present movements is so slight that they need no consideration in a brief survey of recent movements. What is known as the *New Education* had its beginning early in the eighteenth century, with the movement from the abstract towards the concrete, and with the growing tendency to give more attention to the individual child. The one to whom the nineteenth century owes the greatest debt for progress in education is Johann Heinrich Pestalozzi (which see). Pestalozzi's principles as set forth below cover the field of education:

(1) The principles of education are sought in human nature. (2) This nature is organic, consisting of physical, intellectual and moral capabilities, ready and struggling to develop themselves. (3) The function of the educator is both negative and positive. He must remove impediments to the learner's development, and he must also stimulate the exercise of his powers. (4) Self-development begins with sensations received through the senses. These sensations lead to perceptions which, registered in the mind as conceptions or ideas, constitute the basis of knowledge. (5) Spontaneity and self-activity are the necessary conditions under which the mind educates itself and gains power and independence. (6) Practical aptness depends more on exercise than on knowledge. "Knowing and doing must, however, proceed together. The chief aim of education is the development of the learner's powers." (7) All education must be based on the learner's own observation, "this is the true basis of all knowledge." (8) What the learner has gained by his own observation has become an actual possession, which he can explain or describe in his own words. (9) The learner's growth necessitates advancement from the near and actual to the more remote, hence, from the concrete to the abstract, from particulars to generals, from the known to the unknown.

The study of psychology (which see) has advanced as rapidly as the study of education, and as a result methods of teaching have been greatly improved. In all civilized countries untrained teachers are now the exception. The relation of the school to the state is more fully understood and the individual as the supreme factor in education is generally realized.

Recent changes in industrial and social life are compelling educators to make their methods of instruction more concrete and to make courses of study more practical. The relations of the school to the community have broadened until the schoolhouse is the center of many community activities. Everywhere the movements of education are toward a more perfect citizenship; a better America.

See *Methods of Teaching*, Consult Bagley's *The Educative Process*, Colvin's *The Learning Process*, Strayer's *The Teaching Process*.

PEDIMENT, the low, broad, triangular gable at the end of a building of classic style. Across the bottom of it extends the cornice and midway over it meet the two roof ends. The pediments of stone buildings usually are decorated with sculpture. The finest classic examples of pediments are those of the Parthenon at Athens. One of the finest of American pediments is on the Bank of Montreal.

PEDOMETER, an instrument somewhat resembling a watch in appearance, by means

of which a walker can estimate the distance he has traveled. The instrument is carried in the pocket and the movement of the body made with each step is registered by a lever. To estimate the distance walked it is necessary to ascertain the length of the ordinary step and multiply this by the number of steps registered. See CYCLOMETER.

PEDRO II (Portuguese pron., *pa'dro*) (1825-1891), emperor of Brazil, who succeeded to the throne on the abdication of his father, Pedro I, in 1831. Brazil prospered greatly under the rule of Pedro II, who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in 1888. He made several visits to Europe, and was deposed by the revolution of November, 1889.

PEEL, ROBERT, Sir (1788-1850), a British statesman, educated at Harrow and at Oxford. He entered Parliament at the age of twenty-one and became Undersecretary for War and the Colonies and later was made Chief Secretary for Ireland. His attitude toward the Irish question brought him into conflict with O'Connell and the extreme Catholic party, and a duel between him and O'Connell was narrowly averted. He established the Irish constabulary while in this office and later established the London police force, which took from him the names of "Peelers" and "Bobbies." He was returned to Parliament in 1817 from Oxford, but some years later his changed views on the Catholic emancipation question led to his defeat. In 1834 and in 1841 Peel was Prime Minister, and during his second term in that office he changed from a Conservative and supporter of protection to a free trader. He also gave his support to a repeal of the Corn Laws (which see).

PEER, a word meaning *equal*, but in England applied only to the nobility who are members of the *peerage*, because each is entitled to a seat in the House of Lords, or Peers. The titles included in the peerage are duke, marquis, earl, viscount, and baron. In the United States the word means *equal*. The law providing that a man accused of a breach of law has the privilege of a hearing before a jury of his peers means that he may be tried by a jury of his fellow citizens.

PEGASUS, in classical mythology, a winged horse, created by Neptune from the drops of blood which fell from Medusa's head

as Perseus flew with it over the sea. He is said to have flown to Mount Helicon and with a blow of his hoof to have caused the fountain Hippocrene to gush forth. At the Pirene spring where he often drank he was captured by Bellerophon, who bore the hero away to war with the Chimaera. Later the horse was said to have thrown his captor and flown to Heaven.

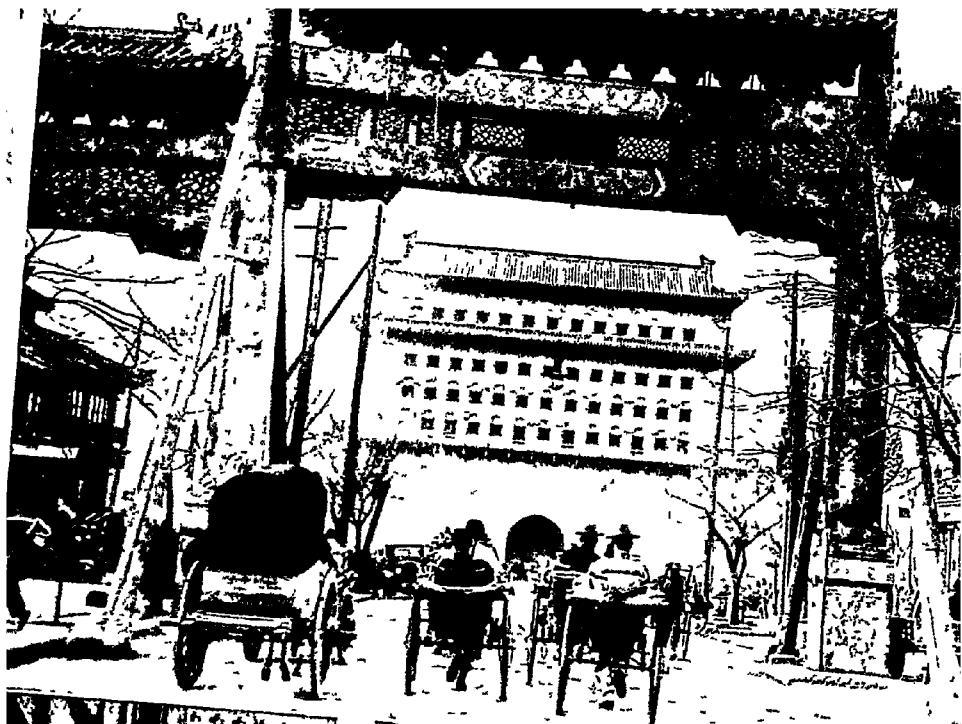


PEIPING, ba'ping', CHINA, for many centuries imperial PEKING, one of the oldest cities of the world and one of the most important, was the capital of the old Manchu dynasty and of the modern republic continuously from 1644 to 1928, when the seat of the Nationalist government was transferred to Nanking. Indeed, Peking was the capital of a Tatar tribe as early as the fourth century, and in 1264 Kublai

Khan (which see) laid the foundations of the city on its present site and made it his capital. In 1928, when the capital was moved, the city was given a new name, and since has been known as PEIPING, a word meaning *northern peace*. Though the seat of government is at Nanking, the foreign embassies still remain at Peiping, in their extensive section of the old Imperial City.

Peiping is situated in the Province of Chih, between the Pei-ho and the Hun-ho rivers, 100 miles from the mouth of the river, at the Gulf of Pe-chu-li. It is at the head of the Grand Canal and about fifty miles south of the Great Wall of China. The city is surrounded by high walls, which are entered by sixteen gates. The outer wall is thirty feet high, twenty-five feet thick at the base and twelve feet at the top, with square towers at intervals of about 180 feet, rising to a height of fifty feet and projecting outward in the form of buttresses. The circuit of the walls is about thirty miles. The city is divided by a wall, extending east and west, into two parts, known as the Tartar, or Inner City, which occupies the northern portion, and the Chinese, or Outer City. The wall of the Inner City is fifty feet high.

The Imperial City. The Imperial City, or Tartar City, is entered through gates in the



IN HISTORIC PEIPING (PEKING)

Above, jinricksha traffic at a city gate, below, a street of retail stores

wall dividing it from the Chinese City, also through gates in the northern wall. Here the buildings of the foreign embassies, referred to above, are strongly fortified, a protection found necessary from experience in the Boxer Rebellion of 1900. The Tartar City contains three enclosures, concentrically arranged. The outer enclosure is occupied by the general populace. The second, which is separated from the first by a wall, contains the former government offices, temples and parks.

The Forbidden City In the center of this enclosure, known as the Imperial City, is the Forbidden City, which was the residence of the emperor and his immediate family and the highest officials. This area was considered sacred and was closed to foreigners, except for special missions. It contains the Imperial palace, grounds, pavilions, and reception halls. The walls of this enclosure, together with the roofs of all the buildings, are covered with yellow tiling. After the establishing of the republic the Forbidden City was opened to foreigners, under certain restrictions.

The Chinese City The Chinese City is the newer portion and was built during the thirteenth century. It contains the greater part of the population and is the business portion of the Chinese capital. Among its important buildings is the Altar of Heaven, with its surrounding temples and shrines, the Temple of Heaven, in which the emperor at midnight in the winter solstice offered sacrifices, and the Temple of Agriculture, near which, each spring, the emperor plowed one or more furrows to inaugurate the opening of the season. The streets in this part of the city are lined with shops, which contain wares of almost every description. While the streets are reasonably broad, and many of them are paved, modern automobiles are seldom seen, and transportation is either by small, covered carts or by sedan chairs. Since the occupation of the city by foreign troops in 1900, considerable progress has been made in improving the streets and the sanitary conditions.

Industries The industries of Peiping were largely related to the government, commercial and manufacturing enterprises are now carried on within the city for the most part to supply the wants of its population.

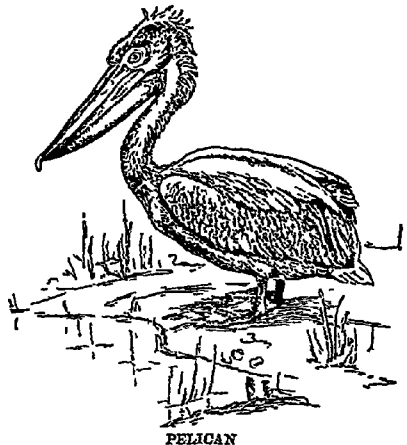
History Peiping has been settled for so many centuries, that it is not known when it

began. It was made one of the capitals by the Khitan Tartars in 937 and was named Nanking, or the Southern Capital. In 1284 Kublai Khan made it his capital and built the present Tartar City, which was the Kam-balu of Marco Polo. It was occupied by the Manchus in 1644 and since then has been very much improved. It had never been entered by foreign troops until 1900, when the allied forces took possession of the city and raised the siege of the foreign legations. The city is connected by telegraph and radio with the centers of the world, and rail connection was established with Tien-tsin, Nanking, and Mukden. The Japanese inroads into China below the Great Wall have endangered Peiping's freedom, and Japanese influence is greatly feared throughout the section.

PELASGIAN, a prehistoric race, widely spread over the whole of Greece, the coasts and islands of the Aegean Sea, Asia Minor and Italy.

PELEE, MONT. See MARTINIQUE.

PELICAN, the name of ten species of web-footed birds, the striking peculiarity of which is the great pouch that lies under the lower mandibles. Pelicans are larger than swans, have great expanse of wings, and are excellent swimmers but very clumsy on land.



PELICAN

They live in flocks on sea coasts, lake shores, and along rivers, and have voracious appetites, feeding chiefly upon fish, which they capture with great skill. The pouch of naked skin is capable of holding several fish, which the bird may preserve for its own consumption.

tion or may carry to its nest for its young, which are fed with food partially digested by the parents

Among the ten known species, several are American—the common, or *white pelican*, of the Mississippi Valley and Canada, the *California pelican*, and the *brown pelican* of the southern sea-coast and the West Indies.

The pelican is used in heraldry as a symbol of mother love and self-sacrifice, for the reason that during the feeding process the mother presses the pouch back against the breast, which gave rise to the ancient tale that the pelican fed her young upon her own blood. The state of Louisiana, known as the *Pelican State*, has this bird for its heraldic device.

PELLAGRA, *pe lag'rah*, a disease affecting the inhabitants of mountainous regions of Italy, Northern Spain and the southeastern parts of the United States. Pellagra has been known in Europe for more than 200 years, but it was not discovered in the United States until 1864. After 1900 it developed very rapidly in the latter country, and at one time there were 50,000 cases.

The prevailing symptoms are continual abdominal pain, irritability and red and black blotches on the skin. The victims are usually between thirty and forty years of age. The disease is not contagious, and methods of treatment have been discovered which cure eighty per cent of those who contract it when young. The chief cause of the disease is considered to be a diet consisting of the same articles of food for a long time, such as fat meat, bread and molasses. Adding lean meat, peas and beans to the diet usually effects a cure. Injections of sodium citrate and cacodylate are also beneficial.

PELOPONNESIAN, *pel o pon ne'shan*, **WAR**. See GREECE, subhead *History*.

PELOPONNESUS, the peninsula which forms the most southern part of Greece, now called the Morea. It is joined to the remainder of the country by the narrow isthmus of Corinth. The ancient Peloponnesus was divided into six states, Messima, Argolis, Laconia (Sparta), Elis, Arcadia and Achaea. See GREECE, subhead *History*.

PELOPS, in Greek mythology, son of Tantalus, king of Phrygia. Tantalus, who was a favorite with the gods, one day served to some of them a feast, the chief dish of which consisted of his son, Pelops. All the gods recognized the dish that was set before

them and refused to eat, except Ceres, who, deep in mourning for her daughter, noticed nothing and ate a part of the boy's shoulder. Pelops was afterward restored to life by the gods, and Ceres replaced the lost shoulder with one of ivory. With the aid of Neptune, Pelops married Hippodamia and succeeded his father-in-law as ruler of the vast kingdom which, according to legend, was called after him Peloponnesus. Atreus and Thyestes were his sons.

PELVIS, *THE*, a bony basin, formed by the two innominate bones and the sacrum. Into the sockets of the innominates are fitted the thigh bones. The lower part of the intestines is in the pelvic cavity. See SKELETON, for illustration.

PEMBERTON, JOHN CLIFFORD (1814-1881), an American soldier, born at Philadelphia. He graduated at West Point in 1837 and entered the artillery service. He served in the Mexican War and became major after the Battle of Molino del Rey. He resigned from the service at the outbreak of the Civil War, entered the Confederate army and soon was made major general. Pemberton conducted a skilful defense of Vicksburg before a continuous bombardment, from the middle of May until July 4, when he surrendered. After the war he lived as a planter in Virginia and Pennsylvania.

PEMBROKE, *ONT*, the county town of Renfrew County, on Allumette Lake, an expansion of the Ottawa River, and on the Canadian Pacific and Canadian National railways, 105 miles northwest of Ottawa. There is ample water power for many industries (hydro-electric power) including the manufacture of flour, woolen goods, leather goods, and steel furniture. There are four machine shops, three foundries and a tannery. The town also has an extensive trade in lumber. There is a collegiate school and a well-equipped library. The Algonquin National Park is twelve miles distant. Population, 1931, 9,368.

PEMMICAN, the name of a food formerly prepared and extensively used by the Indians living in the northern part of North America. Originally it consisted of dried lean meat, of the buffalo or deer, pounded to a powder and mixed with boiling fat, then pressed into cakes and packed in cases until needed. Beef is now used in the place of buffalo or deer meat, this innovation was introduced by Gail Borden (1801-1874), who

later became famous for the manufacture of condensed milk. When properly prepared, pemmican contains a large amount of nourishment in a small space. For this reason it is still used by hunters and traders who travel long distances through the sparsely settled regions of Canada, and by explorers in the polar regions.

PEN, an instrument for writing. Pens have been in use from very early times, and in each age they were adapted to the material on which the characters were to be made. The Roman's pen consisted of a metal stylus with a stiff point and was used for writing on tablets coated with wax. In Greece and in Eastern countries a hollow reed was used, and this undoubtedly led to the quill pen. Quill pens were made of the quills of the goose and crow and were used for several centuries before they were replaced by metal pens. The quills were taken from the wings of the bird and placed in hot sand until dry, when the pen was made by whittling the quill into shape with a small knife.

Steel Pens. We do not know when or by whom the steel pen was invented, but the manufacture of steel pens by machinery was begun by Joseph Gillott in 1820. He succeeded in making a pen of thinner and more elastic steel and in giving it a better temper and finish than had been previously done. The method which he established has, with some improvements, been followed until the present time.

Pens are now manufactured by machinery. Steel of the best quality is used. This is rolled into thin sheets six feet long and about one and one-half feet wide. These sheets are cut into strips, equal in width to the length of two pens. The strips are then heated to a dull red, in tight iron boxes, and allowed to cool slowly. When cooled they are cleaned and rolled with great care to the necessary thickness. Blanks, of the shape and size of the pen, are then punched from the plates. The blanks are then stamped and slit on each side of the point, so as to make the pen more flexible. They are then heated and rounded by being stamped with a die, which fits into a mold. The pens are then tempered, and the points are ground and split. The pens are then sorted, the imperfect ones being thrown out, and the others packed in boxes of one gross each. The annual output of steel pens for the world is estimated at from ten to twelve million gross, of which two and

a half million gross are made in the United States. Birmingham, England, is the leading center of the industry.

Other Pens. Gold pens are valued for their durability and flexibility. They have iridium points. Fountain pens have a hollow holder which is filled with ink that flows as the pen writes. The latest development in these pens is a glass-covered slot through which one may see at any time the quantity of ink in the pen barrel.

PENANCE, *pen'ans*. In the Roman Catholic Church any member guilty of a spiritual offense is expected to make confession to his priest, who imposes upon the sinner some disciplinary punishment and grants absolution after compliance with his demands. Penance therefore implies *contrition*, *confession* and *satisfaction*—the atoning for an evil deed with a good one. The authority for the sacrament is found in *John XX*, 23: "Receive ye the Holy Ghost, whose sins ye shall forgive they are forgiven them, whose sins ye shall retain they are retained."

PENANG', an island belonging to Great Britain, lying at the north entrance of the Malacca Strait, off the western coast of the Malay Peninsula. Its area is 107,000 square miles. The greater part of the surface is level, although there is a mountainous tract in the north. The island produces coconuts, areca, pepper, nutmegs, cloves, rice, sugar, coffee and indigo. There are large supplies of tin in the mountainous region. Georgetown, the capital and port of the settlement, is a growing town with a large commerce. Population, about 185,000.

PENCIL. The ancient Egyptians used lead for marking on papyrus, and the Romans used small bars of it for the same purpose. From this early use of lead we get the name *lead pencil*, though the so-called lead pencil to-day contains no lead whatever. When men learned that graphite would make a blacker mark than lead that substance was named *black lead*, and for nearly 400 years it has given its name to the pencil in common use.

Manufacture. In the manufacture of pencils powdered graphite, free from all impurities, is mixed with pipe clay, the quantity depending on the degree of hardness required. For hard pencils they are mixed in equal parts, and for ordinary writing pencils the proportions are seven parts of clay to ten parts of graphite. After being ground to-

gether with water for several hours, the doughy mixture is shaped into leads, by being placed in an iron cylinder, with a plate in the bottom, which has holes of the same size as the leads to be made. By the use of a piston, worked by a screw, the mixture is squeezed out in coils through the holes. While wet, the coils are straightened, cut into pieces and allowed to dry. Pine and red cedar are generally used for casing. The wood, cut into little slabs the width of six pencils, is passed through a machine which makes the grooves. The graphite sticks are placed in these grooves, and another grooved slab is glued to it. When dry the blocks are cut into pencils, by being run through a machine with revolving knives, and are then finished.

Depending upon the mixture of ingredients, the lead in pencils is made soft, medium, or hard. The marks 1, 2, 3, 4, or A, B, C, D, indicate degrees of hardness, the first letter or figure identifying the softest. The world's product of lead pencils probably amounts to nearly two thousand millions a year, half of which are made from American-grown cedar.

Other Pencils. Colored pencils are made by mixing colored clay or chalk with wax and enclosing it in a case of wood or paper. Slate pencils are made of soft slate, and may be encased in wood but they usually consist of a small rod of slate. Pencils for marking on glass or crockery are made of wax colored with lampblack or ivory black.

PENDANT, in architecture, a hanging ornament, used in the vaults and timber roofs of Gothic buildings, more particularly in late Gothic work. In vaulted roofs, pendants are of stone and commonly are between two arches; in timber roofs, they often occur at the intersection of beams.

PENDLETON, ORE, home of the "Round-Up," county seat of Umatilla County, forty-five miles southwest of Walla Walla, Wash., on the Umatilla River and on the Northern Pacific and Union Pacific railroads. There is an airport of 200 acres. Four bridges cross the river. The town is in a great wheat-growing region. The river furnishes good water power, and there are flour and woolen mills, wool-scouring plants, machine shops, and other factories. There is a parochial school, a Carnegie Library, a Federal building and the state hospital for the insane. Population, 1930, 8,181.

PENDULUM, a weight suspended from a fixed point, so that it will swing freely to

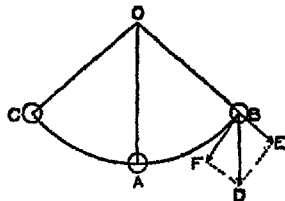
and fro by the force of gravity and the impulse which it receives from its own motion. A small, heavy body, suspended from a fixed point by a string and caused to vibrate without much friction, is the simplest form of pendulum. In the figure, *A* is the weight, *O* the point of suspension, and *B* and *C* the ends of the path over which the pendulum swings. The path *CAB* is called the *arc*, and the movement of the pendulum from *B* to *C* constitutes a *vibration*.

The force of gravity tends to draw the ball at *B* in the direction of *BD*, but the resistance of the string, *OB*, causes it to take the direction of the resultant, *BF*, which is at right angles with *BE*, and thus to swing in the arc *CAB*. The distance from the lowest point in the arc to either end, as *AB* and *AC*, constitutes the *amplitude* of the vibration. Clock pendulums are usually made by the hanging of a circular piece of metal, called the *bob*, or *disk*, to a wire, which is attached by its upper end to the frame of the clock.

The time of vibration of a pendulum depends upon its length. A pendulum which will vibrate seconds in the latitude of New York is about 39.1 inches or 993 of a meter long. The vibrations are governed by the following laws:

- (1) In the same pendulum, all vibrations of small amplitude are made in the same time.
- (2) The time of vibration of different pendulums are proportional to the square roots of their respective lengths. If a pendulum to vibrate seconds must be 39.1 inches long, one to vibrate three times as fast would have to be one-ninth as long.
- (3) The time of vibration for the same pendulum will vary in different places, since it decreases as it is moved from the equator to the poles.

Since the rod in most clock pendulums lengthens in summer and shortens in winter, it is necessary that means for preserving the uniform length of a pendulum be provided. In clocks known as regulators, such as are used by watch makers, the pendulum rod consists of a frame of rods of different metals, so arranged that as some expand downward, others expand upward, thus keeping the mean length of the pendulum the same.



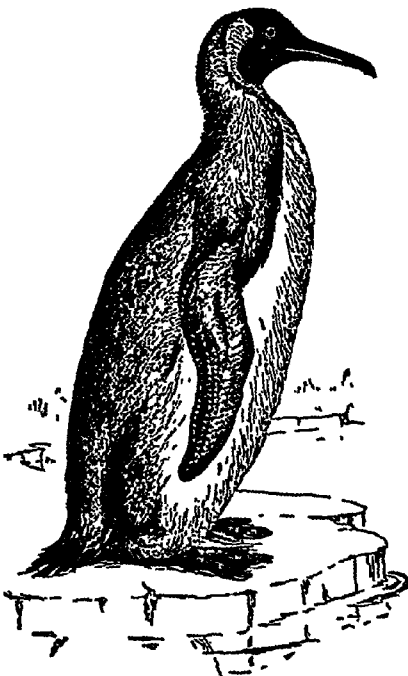
Another style, known as the mercurial pendulum, has but one rod, but the weight consists of a cup containing mercury. As the rod lengthens, the mercury expands upward, and as the rod shortens, the mercury contracts downward, thus preserving the length of the pendulum. See CLOCK.

PENELOPE, in Greek mythology, the wife of Ulysses. Shortly after the birth of his son Telemachus, Ulysses went with his countrymen to war against Troy. During the twenty years of his absence Penelope was besieged by suitors, who tried to make her believe that Ulysses was dead. She attempted to rid herself of them by promising them that she would choose one of them as soon as she had finished a piece of tapestry which she was weaving. Each night, however, she unraveled what she had done during the day. When her suitors became aware of this ruse they grew more clamorous, and Penelope then promised that she would marry any one of them who on a certain day should bend the bow of Ulysses, knowing well that none of them was strong enough to do this. When the day of the trial came, an aged beggar who had made his way to the palace entered with the suitors and, after they had all tried, took the bow and bent it easily. He then threw off his disguise, showed himself as Ulysses and put the suitors to death.

PENGUIN, *pen'gwin*, a queer-looking bird of the Antarctic region, having a ducklike body and varying in size, according to species, from eighteen inches to three feet. Rudimentary wings, short and covered with scalelike feathers, are useless for flight. On shore the penguins are awkward birds, they walk queerly about on their short legs or crawl over the ice and snow with the aid of their wings, in the water, however, they are graceful, rapid swimmers, using their wings as paddles.

They are protected from the intense cold by a layer of fat under the skin. They live and breed in colonies, and the male and female share the labor of incubation. Usually one egg is laid, and this the bird holds between the thighs until it is hatched. Of the fifteen species, the king penguins are the largest. Silvery-white breasts, blue-gray backs and wings, black heads and yellow throats give these birds a striking appearance. When Amundsen, the Antarctic explorer, reached the South Pole the penguins there saw men for the first time. They were

not at all afraid of the newcomers, and even showed a lively interest in them, intelligently imitating some of their movements.



PENGUIN

PENINSULAR WAR, a seven-years' struggle in Spain and Portugal between those countries and France. England aided them against the inordinate ambition of Napoleon. After Nelson had destroyed the French fleet at Trafalgar, Napoleon, fearing an invasion of the British by way of the Iberian Peninsula, subjugated the country and placed his brother Joseph Bonaparte on the Spanish throne. The Spanish and Portuguese peoples rose in defense of their liberties and waged a fierce guerrilla warfare against the invaders. Of the memorable struggle which ensued, the main features were the retreat of Sir John Moore to Coruña, and his death there, the accession of Sir Arthur Wellesley, afterwards Duke of Wellington, to the supreme command, his formation of the celebrated lines of Torres Vedras, where he held the French armies in check until he had accomplished the complete liberation of Portugal, and his subsequent victorious march through

Spain, marked by the great battles of Salamanca and Vitoria.

PENN, WILLIAM (1644-1718), the founder of the state of Pennsylvania, and the most widely-known member of the Quakers, or Society of Friends, was born in London. His father was an English admiral and a man of wealth. Penn was educated at Essex and Christ Church, Oxford. While in college he was converted to the Quaker belief. He left college and was driven from home by his father, but was afterwards sent to France and Germany, where he became acquainted with many people of broad religious views. Penn's stay in France and Germany seemed to have driven all Quaker ideas from his mind, and upon his return his father placed him in charge of several large estates in Ireland. Here he met Quaker influence again and was again converted.

Later Penn became a Quaker preacher, and on account of an essay, entitled *The Sandy Foundation Shaken*, was imprisoned in the Tower of London for seven months. During this time he wrote his most celebrated work, *No Cross, No Crown*. The persecutions of Dissenters continuing to rage, Penn



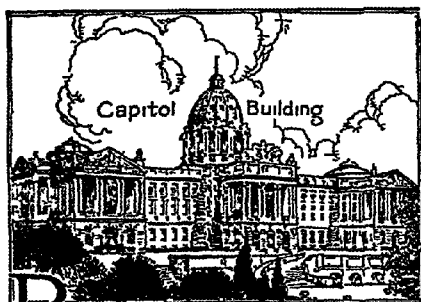
WILLIAM PENN

turned his thoughts toward the New World. From his father he had inherited a claim upon the government of \$30,000, and in settlement of this claim the government in 1681 granted him large territories in North America, including the present state of Pennsylvania, with the right to found a colony or society with such laws and institutions as expressed his views and principles. A settlement was established in 1682, and a little later Penn came to America and laid the foundations of his colony on a more free and democratic basis than had at that time been allowed in the world. Members of all denominations and countries gathered there, the city of Philadelphia was laid out upon the banks of the Delaware, and the colony soon came into a most flourishing condition. The founder remained in the province about two years, when he returned to England, remaining there about fourteen years.

Penn was on friendly terms with Charles II and James II and when William and Mary came to the throne he was accused of treasonable intentions and for three years he hid himself in London. He was finally acquitted, and in 1699 he again sailed for Pennsylvania, intending to make it his future residence. However, he returned to England in 1701, leaving the management of his affairs to an agent named Ford, by whose dishonesty Penn was financially ruined. When Ford died he left claims against Penn that were pressed to such a degree that Penn allowed himself to be thrown into prison to escape extortion. His affairs were finally adjusted by his friends and he was released, but the imprisonment injured his health, and he died in 1718. Because of his liberal views concerning religion and government, and his kindness and fair dealing with the Indians, William Penn is regarded as one of the leading characters in American history.

PENNAHOOK, a word which meant *crooked place*, was the name of a tribe of New England Indians, inhabiting Southern Maine, New Hampshire and Massachusetts. They were at first friendly with the English, but later turned from them. The English settlers took their lands until the Indians were rendered practically homeless, and the chief had to petition for enough land to live upon. There was peace until a number of Indians were seized through treachery. What remained of the tribe of over 3,000 Pennacooks sought refuge in Canada, and they gave the French assistance in the French and Indian Wars.

PENNELL, pen'el, JOSEPH (1860-1926), one of the foremost American etchers and lithographers, also a writer of distinction. He was born in Philadelphia and studied at the Pennsylvania Academy of Fine Arts and the Pennsylvania School of Industrial Art. Since 1884 he has lived chiefly in London. In Europe Pennell is the most widely known of American graphic artists, and his etchings, drawings and lithographs form part of the collections of all the great galleries. His writings include *A Canterbury Pilgrimage*, *An Italian Pilgrimage*, *Our Sentimental Journey through France and Italy*, *Pen Drawing and Pen Draughtsmen*. In collaboration with his gifted wife, Elizabeth Robins Pennell, he wrote *Lithography and Lithographers*, *The Authorized Life of J. McN Whistler* and *The Graphic Arts*.



PENNSYLVANIA, the second largest of the North Atlantic states, and one of the foremost American commonwealths in riches, population and industrial progress. New York alone exceeds it in value of manufactures and number of inhabitants, while in mineral resources it far outranks any other state. The name of the state is a combination of Penn (in honor of Admiral Penn, father of the founder, William Penn) and *sylvania*, which means woodlands. **KEYSTONE STATE**, the popular name, refers to its position at the center of the arch formed by the thirteen original states.

Location and Size The southernmost of the North Atlantic group, Pennsylvania touches West Virginia, Maryland and Delaware on the south. West Virginia and Ohio are on the west, Lake Erie and New York are north, on the east the state is separated from New Jersey by the Delaware River, which also forms for a short distance the boundary between New York and Pennsylvania. Except for its water boundaries, Pennsylvania has straight bounding lines, and in shape is a fairly regular rectangle. Nowhere does it touch the Atlantic coast, but the Delaware Bay and River enable the largest ocean vessels to visit Philadelphia, fifty-five miles from the ocean.

With an area of 45,126 square miles, Pennsylvania is the thirty-second state in the Union in size. Mississippi, which is nearest it in area, is larger by 1,739 square miles. Of the gross area, 294 square miles are water. Among the North Atlantic states only New York is larger.

People and Cities According to the census of 1930 the population numbered 9,631,350, a gain of 10.5 per cent in ten years. The state ranks sixth in density with 214.8 persons to the square mile.

The Negro population is large, that is 400,000. Among the foreign-born inhabitants, the most numerous racial groups are the German, Irish, English, Italian, Polish and Austrian. The chief religious denominations are, in order, Roman Catholic, Methodist, Lutheran, Presbyterian, Reformed and Baptist. As the old colony was a center of religious toleration, Pennsylvania still has a number of sects not found elsewhere in the United States in great numbers. Among these are Mennonites, Schwenkfelders, Moravians and Dunkards. The eastern part of the state is still a stronghold of the Quakers or Friends. The kindly William Penn, founder of the colony, was a Quaker.

Cities Over three-fifths of the people live in towns or cities, and Philadelphia, the metropolis of the state, ranks third among the cities of the Union, following New York and Chicago. In 1930 its population was given as 1,950,961. The next four, in order of size, with Federal figures for 1930, are as follows: Pittsburgh (669,817), Scranton (143,433), Erie (115,967), Reading (111,171). Harrisburg, the capital, was credited with 80,339 inhabitants in 1930. (For list of important municipalities described in these volumes, see end of article.)

Surface and Drainage The surface of Pennsylvania is divided into three distinct regions. The southeastern region, which comprises that portion of the state lying to the east of the first range of mountains, is a part of the Piedmont plateau. This portion of the state is near sea level, the surface rises by gradual slopes from this low plain to an altitude of 500 feet at the foot of the mountains. The surface is somewhat rolling, and is crossed in a number of places by chains of hills. The largest of these, known as South Mountain, extends entirely across the state, in a southwest and northeast direction. The second, or highland region, comprises the mountainous section, which extends across the state from the northeastern corner in a southwesterly direction. Beginning with the low ridge known as South Mountain, this region comprises several parallel ranges of mountains separated by intervening valleys. The most important of these on the east is Blue Mountain, which in New Jersey is known as the Kittatinny Range, through which the Delaware River cuts its way, forming the famous Delaware Water Gap. West of Blue Mountain are a number of ranges with dif-

ferent names, all of which belong to the Alleghany Mountains. All of these mountains have steep slopes on the eastern side and gradual slopes on the western. The highest point, Blue Knob, is 3,136 feet above the sea. Streams flow through the intervening valleys, and the Susquehanna cuts its way across the ranges. Much of this region is covered with forests. The third region, known as the Alleghany plateau, lies to the west of the mountain range. This is a high plateau, varying in altitude from 1,000 to 2,500 feet.

The eastern part is drained by the Delaware River, which receives a number of short tributaries. The most important of these are the Schuylkill and the Lehigh, the former entering the Delaware at Philadelphia and the latter at Easton. The Susquehanna River drains the northeastern and central parts. It is formed by a north and a west branch, which unite at Northumberland, and flow entirely across the state in an irregular course. It receives numerous tributaries, most of them shallow, rapid mountain streams, the largest being the Juniata. The Alleghany plateau is drained principally by the Ohio and the two great streams from which it is formed, the Alleghany and the Monongahela. There are in the mountains occasional tarns, or mountain lakes.

Climate. The climate varies in the three natural divisions. In the northwest and west, heat and cold are more excessive than in the east, and changes are abrupt. In the north and mountain regions, the winters are severe, and the summers are delightfully cool. The climate of the eastern section is marked by irregular alternations of the seasons, but the state is, in general, healthful. The mean temperature at Philadelphia is 54°. The average annual rainfall for the state as a whole is 44.6 inches.

Mineral Resources. Pennsylvania holds first place in mineral products, very considerably on account of the large deposits of both anthracite and bituminous coal. The anthracite mines are found in the northeastern part of the state, chiefly at Wilkes-Barre, Hazleton, Shenandoah, Ashland, Pottsville and Scranton; the output exceeds that of any other state or any country, reaching a total of 50,000,000 to 90,000,000 tons a year. In the western part of the state are extensive measures of bituminous coal. These are situated chiefly in the Monongahela, Irwin, Mercer, Connellsville, Johns-

town, Idlewood and Clearfield districts. The annual yield has at times reached between 150,000,000 and 200,000,000 tons. Many of the coal measures contain layers of sandstone, iron ore, limestone and fire clay between the seams of coal. Coke made from bituminous coal is produced in great quantities.

Pennsylvania is also the leading state in the production of cement. The Lehigh district, which includes one county in New Jersey, is the source of nearly one-third of the entire American output. In total value of clay products the state is surpassed by Ohio, but in the single production of brick and tile it ranks first. The production of natural gas is nearly 89,000,000,000 cubic feet. Petroleum is still being produced, but the annual yield has fallen to between 11,000,000 and 13,000,000 barrels.

In the production of stone, slate, sand, gravel and lime the state holds first place; the annual yield of slate alone is over half of the total production of the United States. Other mineral products include iron ore, feldspar, graphite, copper, glass sand, metallic paints and mineral waters.

Agriculture. The valley lands of Pennsylvania are remarkably fertile. There are about 172,000 farms, the cultivated area is over 15,300,000 acres. The production of hay and cereals, market gardening, fruit and flower growing and forestry are all important branches of agriculture. In point of acreage hay is the leading crop; the annual harvest is over 3,000,000 tons. Among cereals corn ranks first in yield, followed by oats, wheat and rye. The annual corn crop yields more than 45,000,000 bushels. Pennsylvania is well known for its immense crops of buckwheat, potatoes and tobacco.

In the southeastern part climate conditions favor the production of fruit, as may be seen in the flourishing orchards of apples, peaches and pears. Cherries, apricots and plums are also cultivated, and in the district bordering Lake Erie grapes are grown abundantly. The state is among the first five in the value of dairy products and poultry. The annual wool clip reaches some 3,270,000 pounds. The income from livestock is about \$136,000,000 each year.

Manufactures. Ranking second among the states in total value of manufactured goods, Pennsylvania leads them all in the manufacture of iron and steel products, and it pos-

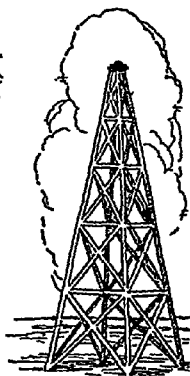
PENNSYLVANIA



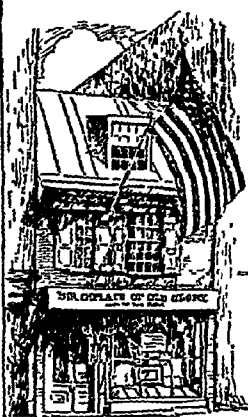
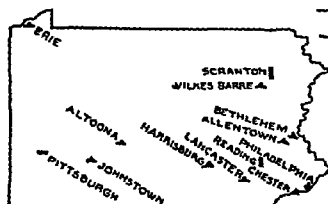
State
Seal



Memorial Chapel at Valley Forge



An Oil Well



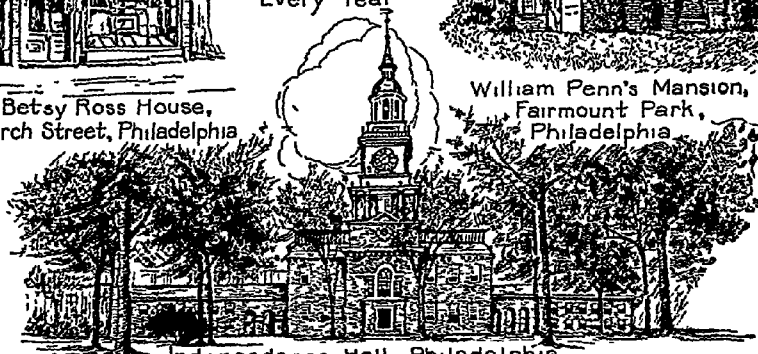
Betsy Ross House,
Arch Street, Philadelphia



275,000,000 Tons
of Coal Mined
Every Year



William Penn's Mansion,
Fairmount Park,
Philadelphia



Independence Hall, Philadelphia

sesses in the city of Pittsburgh the center of the largest steel and iron district in the world. Here is made everything from wire nails to locomotives and structural bridgework. Among the establishments in the Pittsburgh district are plants of the United States Steel Corporation, the Westinghouse Air Brake Company and the Westinghouse Electric Company. The main plant of the famous Baldwin Locomotive Works is at Eddystone near Philadelphia. In the state as a whole there are over 2,300 establishments devoted to the manufacture of metal and metal products.

Second in value of products is the textile industry, and in this branch of manufacture Pennsylvania is surpassed only by Massachusetts. Among the products represented are woollens, worsteds, silks, felts, knit goods, cotton fabrics and hosiery. Philadelphia is the foremost city in the manufacture of textiles. Tanning and the finishing of leather, in which Pennsylvania ranks first in the Union, printing and publishing, glass making, shipbuilding and slaughtering and meat packing are other major industries.

Transportation. The state has excellent transportation facilities. Lake Erie gives access to the Great Lakes, and Ohio makes accessible the Mississippi route, while the Delaware and other navigable streams, together with numerous canals, provide water connection with markets in various sections of the country. The state is surpassed only by Texas and Illinois in railway facilities, its steam mileage being about 11,155. There are, besides, over 4,000 miles of electric railway, and about 19,000 miles of paved highways. The leading railroads are the Pennsylvania, the Delaware, Lackawanna & Western, the Philadelphia & Reading, the Lehigh Valley, the Delaware, Lackawanna & Western, the Jersey, Baltimore & Ohio, the Erie and the New York Central. The state has 40 airports and is crossed by five air routes; it is served by eight major bus lines.

Education. The present system of education dates from 1834, when Pennsylvania established a system of free public schools. The schools are under the direction of the superintendent of public instruction. Counties are divided into districts, each of which usually includes a township. The schools of the districts are managed by boards of directors elected by the people, and these boards within the county elect a county superintendent.

All cities have excellent systems of graded schools. Vocational courses are now included in the curriculum of certain schools. School attendance is compulsory for pupils between the ages of eight and sixteen and free from six to twenty-one. In the rural districts attendance may be reduced to seventy per cent of the term.

The state maintains fourteen teachers colleges. The Pennsylvania State College, located at State College, devotes special attention to modern industrial pursuits and to agriculture. In all there are 96 institutions of higher education in Pennsylvania including the University of Pennsylvania, (the most important of them, although it is not maintained by the state), other institutions are Dickinson College at Carlisle, Lafayette College at Easton, Lehigh University at Bethlehem, Haverford College at Haverford, University of Pittsburgh and the Carnegie Institute of Technology at Pittsburgh, Swarthmore College at Swarthmore, Temple University at Philadelphia and Bryn Mawr College at Bryn Mawr, the latter a famous institution for women.

Government. The legislature consists of a senate of fifty members and a house of representatives whose number depends upon the population, but it is about 208. The senators are elected for four years, and the representatives for two years. One-half of the senators retire every two years. The head of the executive department is the governor, elected for a four-year term. Other important officers are a lieutenant-governor, secretary of the commonwealth, treasurer, auditor, adjutant-general, attorney-general, superintendent of public instruction, secretary of labor, secretary of highways and secretary of agriculture. The courts consist of a supreme court of seven judges, elected by the people for twenty-one years and not eligible for reelection, superior courts, which are held in the various judicial districts into which the state is divided, courts of common pleas and quarter sessions, besides local courts, established in towns and cities.

Other Institutions. There are thirty penal and benevolent institutions wholly supported by the state, and seven semi-state institutions, besides hundreds of private homes and hospitals receiving state aid. The deaf and dumb, the blind, the feeble-minded, epileptics and other defectives are given the best scientific treatment available. Among the state

Items of Interest on Pennsylvania

The state motto is "Virtue, Liberty, Independence."

The triangular section in the northwest-ern part of the state bordering on Lake Erie was purchased by early settlers from the national government for the purpose of giving Pennsylvania a port on the Great Lakes

During the Revolutionary period Benjamin Franklin was the most distinguished citizen of Pennsylvania. He was buried in the churchyard at Fifth and Arch streets, Philadelphia.

At Johnstown a terrible flood occurred in 1889, causing the loss of more than 2,200 lives. It resulted from the bursting of the dam at Conemaugh Lake, the source of the city water supply.

Pennsylvania abolished hanging as a punishment for crime in 1913, substituting electrocution.

Pennsylvania was the first state in the Union to establish a state police force. The second one to do so was New York, and it was followed by many others.

The home of Betsy Ross, who made the first American National flag, is preserved as a memorial. It is located at 229 Arch Street, Philadelphia.

Originally Pennsylvania was one of the most densely forested states in the Union, but the virgin timber has been largely cut. The present forest growth covers about half the area of the state, and includes white and yellow pine, hemlock, hickory, elm, maple, beech, chestnut and walnut.

The state is governed by the constitution which went into effect in January 1874. It was the fourth to be adopted.

William Penn wished to have the colony called simply *Sylvania*, but Charles II, king of England, insisted that Penn be prefixed out of respect for William Penn's father.

The Sesqui-Centennial Exposition in 1926 celebrated the drafting of the Declaration of Independence on its hundred fiftieth anniversary.

Famous men in the history of Pennsylvania include William Penn, Benjamin

Franklin, Benjamin West, Stephen Girard, Andrew Carnegie and Gifford Pinchot.

Questions on Pennsylvania

From what words is *Pennsylvania* derived? Where did the state get its nickname *Keystone*?

What are the land boundaries of Pennsylvania?

Compare New York and Pennsylvania as to population, size, manufacturing importance and mineral wealth.

Make the same comparisons, using Illinois in place of New York.

What was the percentage increase in population between 1920 and 1930?

What interesting religious sects are found in the state?

Are there any high mountains in the state?

What is the most picturesque scenic feature of Pennsylvania?

How does the state compare with other sections on the globe in regard to anthracite?

In what mineral products does the state take first rank in the Union?

What branches of agriculture prosper in the state?

What is the greatest iron and steel district on the face of the globe?

What is the state's rank in the production of textiles? In leather finishing?

How is the number of members elected to the state house of representatives determined?

What provision does the state make for defectives?

What racial group made the first settlement in Pennsylvania?

Where was the Declaration of Independence signed and the Constitution adopted?

If a visitor in Philadelphia would you care to visit 239 Arch Street?

What was the cause of the Johnstown flood?

What event was celebrated in Philadelphia by the Centennial Exposition?

institutions are the hospitals for the insane at Allentown, Danville, Fairview, Harrisburg, Norristown, Warren, Warnersville, and Torrance, an industrial reform school at Huntington, a reformatory at Morganza, an industrial training home for women at Muncy Station and the penitentiaries at Philadelphia, Pittsburgh, Rockview and Graterford

History The Swedes made the first settlement at a site on which later grew up the town of Wilmington, they were permanently established by 1643 They were assisted by 54 German families that came over in one shipload The Dutch from New York overpowered these Swedes in 1655 The English raided the settlements in 1664 and acquired possession by treaty in 1675

The whole territory was granted by Charles II to Wilham Penn in 1681 and in the year following the capital of the province, Philadelphia, was founded The grant to William Penn made him sole proprietor of the land with power to make laws subject to the consent of the freemen, to establish courts, to collect taxes and to raise troops

Penn's plans for government were based on extreme pacifist principles and seemed grossly fantastic to his seasoned critics. There was to be no established church but freedom of worship for all creeds, a basic principle was the policy of non-resistance.

Shortly after his first arrival in America Penn was obliged to return to England and was absent for fourteen years so that his magnificent project was entrusted to the hands of persons little suited to administer his scheme Hence gross mismanagement resulted

Penn invested the greater part of his wealth in his American venture and died without receiving more than a slight return financially He was on the point of surrendering his rights to the crown when he died In fact the colony became so disorderly that it was taken from him in 1692 but was restored in 1694 Nevertheless he afforded a refuge for many religious persons who were subject to persecution elsewhere and his impress on the people of the colony was a most beneficial one

The state was engaged in a long dispute with Connecticut over the Wyoming Valley, and in 1778 it culminated in the massacre at that place Pennsylvania took an active part in the Revolutionary War, and organized an independent state government in 1776

Philadelphia was the seat of the Congress during the war, and important military events also took place within the borders of the state The Federal Constitution was adopted at Philadelphia in December, 1787.

During the Civil War the state was invaded three times, on the last occasion Lee was defeated at Gettysburg The Centennial Exposition was held at Philadelphia in 1876 Thirteen years later occurred the disastrous flood at Johnstown. Labor troubles have been abundant in the steel and coal industries, they have contributed must to the general establishment of the principle of collective bargaining and to the upbuilding of labor organizations Progressive legislation include such subjects as women and child labor, workmen's compensation, state insurance, poor relief, the adoption of the mountain laurel as the state flower, making motorists financially responsible for damages, licensing and inspection of bakeries and milk dealers.

Related Articles. Consult the following titles for additional information

CITIES

Allentown	Mount Carmel
Altoona	Nanticoke
Bethlehem	New Castle
Bradock	Norristown
Bradford	Oil City
Butler	Philadelphia
Carbondale	Pittsburgh
Carlisle	Pittston
Chambersburg	Plymouth
Chester	Pottstown
Columbia	Pottsville
Conneville	Reading
Dubois	Scranton
Dunmore	Shenandoah
Duquesne	Sharon
Easton	Shenandoah
Erie	Sunbury
Franklin	Uniontown
Greensburg	Valley Forge
Hazleton	Washington
Johnstown	West Chester
Lancaster	Wilkes-Barre
Lebanon	Williamsport
McKeesport	York
Mahanoy City	
Meadville	

GEOGRAPHY

Appalachian	Lehigh River
Mountains	Monongahela River
Allegheny (river)	Ohio River
Delaware (river)	Schuylkill (river)
Delaware Bay	Susquehanna River
Delaware Water Gap	

MISCELLANEOUS

Franklin, Benjamin	Penn, William
Gettysburg, Battle of	Ross, Betsy
Independence Hall	Valley Forge
Mason and Dixon's	Wyoming Valley
Line	Massacre

PENNSYLVANIA, UNIVERSITY OF, an institution of higher learning at Philadelphia It originated in a charitable school founded in 1740, but has become one of the largest universities in North America In 1751 this school became an academy, and then was

raised to the rank of a college in 1755. In 1791, by act of the legislature it was made the University of Pennsylvania, but is not supported by the state. The following departments are now maintained: the College of Arts and Sciences, the College for Women, the School of Arts, the Wharton School of Commerce, the Moore School of Electrical Engineering, departments of education, law, medicine, dentistry and veterinary medicine, the Towne Scientific School, the graduate school, the University Hospital, the Wistar Institute of Anatomy and Biology, the Laboratory of Hygiene, a psychological clinic, an astronomical observatory, a department of physical education. The libraries contain more than 797,000 volumes. The student enrollment is about 12,000, the faculty numbers 1,300.

PENNY, *pen's*, a bronze English coin, which weighs 145.833 Troy grains and is worth, intrinsically, about one-fourth of its face value. It is equivalent to four farthings, or one-twelfth of a shilling in English money and to two cents in United States and Canadian money. Its similarity to the Roman coin *denarius* led to the adoption of *d*, the abbreviation of that name, as its symbol, thus 12 s 6d is 12 shillings, 6 pence. In the United States the one-cent piece is sometimes called a penny.

PENNYROYAL, the American name of a medicinal herb belonging to the mint family. The plant is found from Florida to Cape Breton Island and as far west as Nebraska. It grows to be a foot or foot and a half high, has spreading branches and somewhat scant foliage. Oil of pennyroyal, obtained from the leaves, is used medicinally as a stimulant. It is also useful in driving away mosquitoes, the odor being very objectionable to them.

PENOBSCOT, *penob'sskot*, the largest river in Maine, rising in a small lake near the Canadian boundary, flowing southeastward, then south and emptying into Penobscot Bay. Its total course is about 350 miles, it is navigable for large ships to Bangor, sixty miles from its mouth, but small craft ascend the stream far into an extensive lumber region. Great supplies of timber cut on its banks are floated down the river to sawmills. Large quantities of ice are harvested in winter.

PENSACOLA, *FLA*, the fifth city in the state in size and the county seat of Escambia County, is forty-eight miles east of Mobile,

Ala., on the Pensacola Bay, six miles from the Gulf of Mexico, it is served by the Louisville & Nashville Railroad, and by a line of the Frisco system. It has an excellent harbor, with the obsolete forts Pickens, Barrancas and McRee at the entrance. There is a large trade in lumber, fish, naval stores, cotton and coal. A United States navy yard is located here, and during the World War there was ship-building to a greater extent than formerly.

The city has a number of public parks of considerable beauty, and the remains of the old Spanish forts, San Bernardo and San Miguel, are also of interest. The important buildings are the state armory, the Federal building, the courthouse, the board of health laboratory, a great hotel and several large business blocks.

Pensacola was first permanently settled by the Spaniards in 1696. It was captured by the French in 1719, but was restored to the Spaniards four years later. The British took possession in 1763, but the place was captured by the Spaniards in 1781. General Jackson occupied the city during the War of 1812. The United States secured permanent possession in 1821, in accordance with the treaty of 1819, and the navy yard was soon after established. Population, 1920, 31,036, in 1930, 31,579.

PENSION, *pen'shun*, a regular allowance paid to a person at specified times. The term refers to a variety of such allowances—the stipend paid to retired employes of corporations, allotments granted by local governments to dependent widows, payments granted by national authorities to people too old to work, allowances to retired civil service employes, regular payments to soldiers and sailors and their relatives. The principle of civil service and old age pensions is securely established in Europe, and is rapidly gaining favor in the United States.

Pensions in the United States. The national government has been very generous in granting pensions to its soldiers and sailors, but it has done nothing along this line for its civil servants except to grant retiring pensions to Federal judges and to officers of the army and navy. Widows of ex-Presidents are usually granted pensions by special acts of Congress, but this practice is based on precedent and not on law. On the other hand, many private corporations have regular pension funds for employes retired on

account of age, and school teachers in large cities often contribute a certain proportion of their salaries to create a permanent fund for retiring teachers

Military Pensions Plans for pensioning those who were injured in wars with the Indians and for assisting the families of those who lost their lives in these wars were adopted by the colonies before the Revolutionary War. Troops of the Revolutionary army were promised liberal pensions, and officers who remained in the service until the end of the war were promised half pay for life, but the Continental Congress was unable to redeem these promises

After the formation of the Federal government, a general pension law was passed in 1792. In 1816 this law was revised, and the rate of pensions was raised from \$5 to \$8 per month, and the application of the law was extended to those who had been in the army and navy during the War of 1812. In 1818 the application of this law was made to include all survivors of the Revolutionary army or navy who had served nine months at any time during the struggle and were in needy circumstances. The law was so loosely worded that it led to many abuses, which were checked by a new law in 1820. Later, a number of laws were passed favoring the widows of Revolutionary soldiers and of the soldiers of the War of 1812.

The first pension act for soldiers of the Civil War was passed July 14, 1862. This and several of the laws that followed were what are known as *invalid pension* acts, that is, they applied only to those who were wholly or partially disabled by wounds or disease during the war. Pensions were also granted widows and children under sixteen of those who died from wounds or disease, in the event of no widows or children surviving, the pension went to dependent parents or minor brothers and sisters of those who died. The pensions were graded according to the degree of disability or dependence and ranged from \$24 per year upward. Through a succession of laws the pension system has come to be applied to survivors of the Civil War whether disabled or not, and to the widows of pensioners. Veterans of the Spanish-American War and the Philippine insurrection are also included.

In 1912 an act was passed providing that any person sixty-two years old who had served for ninety days in the army or navy,

and had received an honorable discharge, was entitled to receive a monthly pension of \$13 a month. The allowances for those who had served more than ninety days ranged from \$13.50 to \$16, according to length of service. The allowances were also increased according to age of recipients, a maximum of \$30 being awarded men reaching the age of seventy-five who had served three years. In 1918 a new schedule was authorized by act of Congress. The minimum allowance was placed at \$30 a month, and the maximum at \$40.

The World War. When America entered the World War it was decided to substitute an insurance system for the old method of providing for soldiers and sailors. This system is described fully in the article **INSURANCE**.

Pension Administration. All matters pertaining to pensions are cared for in the Veterans' Administration; the former Pension Bureau was merged into this new government branch in 1930. A regular-army officer is Administrator of Veterans' Affairs.

Statistics. The United States has paid to pensioners of all its wars except the World War almost \$9,000,000,000, and in 1935 (June) the pensioners yet living numbered 464,257 persons. Among these were seven widows of veterans of the War of 1812. The Civil War, to the date named, has cost in pensions \$7,831,938,410, the Spanish-American War, \$945,186,750.

Related Articles. Consult the following titles for additional information: **Employer's Liability** **Old Age Pensions** **Mothers' Pensions**

PENTATEUCH, *pen'ta tūkh*, meaning *five books*, the name given to the first five books of the Old Testament, which are *Genesis*, *Exodus*, *Leviticus*, *Numbers*, and *Deuteronomy*. The Jews designated them as the Books of the Law. Some authorities include a sixth book, *Joshua*, and call the whole the *Hexateuch*. Most Biblical scholars credit the books of the Pentateuch to Moses, others believe that portions of them were written after the death of Moses.

PENTECOST, *pen'te lawst*, the Greek name of a Hebrew festival, called by the Jews the Feast of Weeks. It was observed on the fiftieth day after the Passover and celebrated the ingathering of the harvest. In later times observance of Pentecost took the form of pilgrimages to Jerusalem. It was on this day that the Holy Ghost descended

on the Apostles, and thus Pentecost passed over into the Christian Church and became one of the great Church festivals of the year

PENUMBRA, the partial shadow cast during an eclipse, the *umbra* being the total shadow. An observer in the *umbra* sees a total eclipse, one in the *penumbra* only a partial eclipse, and the nearer the edge of the *penumbra* the observer is, the less of the eclipse will he see. An observer outside the *penumbra* sees the luminous body without eclipse. See **ECLIPSE**

PE'ONAGE, a system of enforced labor which has been common in the Spanish colonies of America, particularly in Mexico. *Peon* is a Spanish word meaning *day laborer*. It was originally applied to Indians. The Spanish government exempted Indians from military service and the payment of taxes and tithes, and also excluded them from such political and social privileges as to place them at the mercy of the governors of the colonies, and they used their authority to impose a system of labor upon the Indians that was practically slavery, since they were classed as criminals and compelled to work to pay fines or debts. As soon as a laborer had worked out his sentence, he might be rearested on some other charge and compelled to continue his labor.

While the system was legally abolished long ago, the term *peon* is still applied to laborers of Indian or mixed blood, in localities, where because of ignorance they suffer the old abuses.

PE'ONY, a plant belonging to the buttercup family. It is a native of Europe and Asia and is very generally cultivated in gardens for the sake of the large, fragrant showy flowers, which are solitary and of a variety of colors, crimson, purplish, pink, yellow and white. The tree peonies of California and Japan produce white or rose-colored blossoms which are borne on a stalk three or four feet high. The plant is propagated from cuttings which are potted and kept in a greenhouse or cold frame. It may also be grown from seeds.

PEOPLE'S PARTY. See **POPULIST PARTY**

PEORIA, ILL., since 1880 the second city in the state in size, the county seat of Peoria County, 160 miles southwest of Chicago, on the Illinois River, and on the Chicago & Alton, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Peoria & Saint Louis, the Chicago & Illinois

Midland, the Minneapolis and Saint Louis, the New York, Chicago & Saint Louis, the Chicago & North Western, the Cleveland, Cincinnati, Chicago & Saint Louis and the Toledo, Peoria & Western railroads. Peoria is served by one airport, the Federal Barge Lines, and fourteen paved highways, and three important bus lines. The city is built along the river at the outlet of the expanse known as Peoria Lake. The business section lies near the water, while the residences are chiefly on the bluffs.

The important buildings and institutions include the Bradley Polytechnic Institute, Spalding Institute, Saint Francis Hospital, the Home of the Good Shepherd, the Federal building, courthouse, city hall, the Catholic Cathedral, the state armory, the YM C A, the Y W C A, 100 churches and the Art Institute.

The parks cover 1,552 acres, there are three municipal golf courses, three country clubs and ten theaters.

The city is an important industrial and distributing center surrounded by the great corn belt. About \$140,000,000 of capital is invested in the 460 manufacturing plants, these produce wire goods, power machinery, cotton goods, millwork, chemicals, canned goods, cement, jewelry, food products, liquors, cigars, and mattresses. There is a large trade in grain and livestock.

La Salle visited the site of Peoria about 1680 and erected Fort Creve Coeur, this became an important trading post with a French mission established probably by 1711. In 1763 it passed into the hands of the British and the Americans took it over in 1778, Fort Clark was built as an American military and trading post. The first considerable settlement was made in 1819 and it was incorporated as a town in 1835 and as a city ten years later. It is governed by a mayor and council. Population, 1930, 104,969.

PEPIN, or **PIP'PIN**, the name of several prominent government officials in medieval France who bore the title *mayor of the palace*. **PEPIN THE ELDER** (died 639) was virtual ruler of the country during the reign of Dagobert I. His grandson, **PEPIN OF HERISTAL**, who died in 714, was major-domo at the court of Dagobert II. After the death of the king he was appointed duke of the Franks. Under a feeble regency he ruled the kingdom with almost despotic sway. Charles Martel was his natural son. **PIPPIN**

THE SHORT (714-768), son of Charles Martel, was, by agreement with the Pope, proclaimed king of the Franks in 752, after the deposition of Childerich. He invaded Italy twice, overthrew the Lombards and gave their lands to the Pope, thus laying the foundation for the temporal sovereignty of the Popes which was exercised until the last quarter of the nineteenth century.

PEPPER, a genus of plants which furnish the black pepper of commerce. It is a native of the East Indies, and other tropical



PEPPER

regions where it is cultivated on an extensive scale. It is a climbing plant which yields two crops annually for about twelve years, has large, broad leaves, very small flowers and little globular berries, which, when ripe, are of a bright red color. The *black pepper* consists of the dried berries. The berries are gathered when they begin to change color, and are cleaned and dried in the sun or over a slow fire, in the process of drying the berries turn black. *White pepper* is the seed freed from the external skin and fleshy part of the fruit. *Red pepper* is obtained from the pods of the capsicum. (see **CAPSICUM**) The larger fruited peppers, green or ripe, are used for pickling, sauces, etc.

PEPPERMINT, a perennial herb, cultivated extensively for the pungent oil obtained by distillation from the leaves. It is easily distinguished from other kinds of mint by the leafy stalks and by the spike-like heads into which the flowers are grouped. The oil of the plant has a sharp, pleasant odor and taste, and is used medicinally and for flavoring. Michigan produces nearly one-half of the world's supply of peppermint oil, Saint Joseph county being the center of the industry.

PEPSIN, a ferment found in the gastric juices which changes proteids into peptones (see **PEPTONES**). It acts best in a weak acid, whereas ptyalin, or the ferment in saliva, acts best in a weak alkaline solution. Preparations of pepsin are employed in medicine to aid digestion. The pepsin for these preparations is obtained from the stomachs of calves and pigs. That from the pig is preferred.

PEPTONES, substances formed by the action of the ferment *pepsin* of the gastric juice and the ferment *trypsin* of the pancreatic juice during the process of digestion of such foods as lean meat, beans and white of eggs. These are generally known as *proteid foods*. Peptones are soluble, and they pass through the membranes of the intestines and are absorbed in the alimentary canal. However, before their absorption they are changed into tissue-building compounds, which are taken up by the blood and the lymphatics. Certain predigested foods known as beef peptones, milk peptones, etc., are designed for use by dyspeptics. See **PEPSIN**, **PROTEIDS**.

PEPYS, *peps*, *peeps*, or *pep's*, **SAMUEL** (1633-1703), a famous English writer, whose *Diary* gives a detailed and valuable account of court life in England during the years from 1660 to 1668. It was written in a very abbreviated form and was deciphered and published in 1825. It has gone through numerous editions and remains very popular, being written in a fresh, breezy style and containing a great store of valuable and amusing anecdotes.

PEQUOT, a warlike tribe of New England Indians, which was practically exterminated in a bloody war with the white settlers in 1637.

PERCENTAGE. In an examination Charles answers correctly five questions out of ten, while Mary answers thirty-five out of fifty. Mary has done better than Charles, but how are we to know exactly how much

better? We see that Charles has answered $5/10$ of his questions, and Mary $35/50$, but we require a single term to show their relative degree of merit.

John lost 30 cents out of a dollar he owned and William spent 40 cents out of a dollar he had earned. How shall we find a number which will show what part of a dollar John had more than William?

The two problems above given are like thousands of others, with slight variations, and it is clear that some system of calculation must be found by which they may easily be solved.

In the first problem, let us reduce our fractions to those having the common denominator 100. Then Charles has answered $50/100$ of his questions and Mary $70/100$ of hers. Mary is a better student by $20/100$ than Charles. We have learned to express $20/100$ decimally as .20, which is a simpler form than the fraction.

In the second problem, we begin its solution by remembering that a dollar contains 100 cents. John lost $30/100$ of his money, William spent $40/100$ of his; therefore, John has yet $70/100$ of his original amount, and William $60/100$ of his. John has $10/100$ more money than William, which proportion we express decimally as 10.

These problems are solved on the basis of 100 for the complete amount in each case. We consider in the first instance the questions asked Charles and Mary on the basis of 100, and in the second place we know that the dollar is easily reckoned on its basis of 100 parts, or 100 pennies, comprising the whole. So we may build a section of our arithmetic which shall have for its foundation computations based on 100 parts to make the whole, or the entire thing, and we call this system *Percentage*, from two Latin words, *per* and *centum*, which together mean *by the hundred*. Instead of saying that a certain number is so many hundredths of one hundred, we say that it is so many *per cent*. In writing, we shorten the words *per cent* to the sign %.

The percentage system would not be of much use to us if by its means we could compare numbers only directly with one hundred. It would be easy enough to tell how many one-hundredths of one dollar a quarter is, but it would not help us in telling how many one-hundredths an inch is of a foot, or a quart is of a peck. However, if we remember the simple rule that any common

fraction may be expressed as a per cent merely by reducing it to hundredths, we will find that the application of percentage is extended over a great part of arithmetic. Thus

$$\begin{aligned} 1/2 &= 50/100 = 50\% \\ 1/4 &= 25/100 = 25\% \\ 1/5 &= 20/100 = 20\% \\ 3/5 &= 60/100 = 60\% \\ 3/50 &= 6/100 = 6\% \end{aligned}$$

There are a number of fractional parts of one hundred which are expressed as per cents so often that the per cents should be committed to memory.

$$\begin{array}{ll} 1/2 = 50\% & 2/3 = 66\frac{2}{3}\% \\ 1/3 = 33\frac{1}{3}\% & 3/4 = 75\% \\ 1/4 = 25\% & 2/5 = 40\% \\ 1/5 = 20\% & 3/5 = 60\% \\ 1/6 = 16\frac{2}{3}\% & 3/8 = 37\frac{1}{2}\% \\ 1/8 = 12\frac{1}{2}\% & 5/8 = 62\frac{1}{2}\% \\ 1/10 = 10\% & 7/8 = 87\frac{1}{2}\% \end{array}$$

If we examine the very simplest statement in percentage, 25% of \$24 = \$6, we see that there are three numbers used—the number of which the per cent is taken, the number which tells how many hundredths are taken, and the number which results from taking the indicated number of hundredths of the given amount. The first of these is called the *base*, the second the *rate*, and the third the *percentage*. Thus in the statement above, 25% of \$24 = \$6, \$24 is the base, 25% the rate and \$6 the percentage.

The sum of the base and the percentage is called the *amount*, the difference between them the *difference*.

The Three Cases No problem in percentage can be worked unless two of the three numbers named above are given. These two may be either the base and the rate, the problem being to find the percentage, the rate and the percentage, the problem being to find the base; or the base and the percentage, the problem being to find the rate. The first one is the simplest, and the one most often met with.

Exercises under Case I Given the base and the rate to find the percentage. Let it be remembered that the base represents the whole of anything. In the problem, What is 8% of 500? 500 is the base, as it represents the whole, and we are required to find $8/100$ of this whole. By the analytical method we may more clearly understand the process of the solution.

$$\begin{aligned} 100\%, \text{ or the whole,} &= 500 \\ 1\% &= 5 \\ 8\% &= 40 \end{aligned}$$

The arithmetics tell us that if we have given the base and rate and are required to find the percentage, we multiply the base by the rate, decimally expressed. Let us see why this is correct. In the above problem we have to find 8% of 500. This means that we are to find $\frac{8}{100}$ of 500. Expressed in fractional form, our problem resolves itself to this:

$$\frac{8}{100} \times 500$$

$\frac{8}{100}$ may be expressed decimally as .08. Then we see clearly that the arithmetical process of solution is as follows

$$\begin{array}{r} 500 \\ .08 \\ \hline 40.00 \end{array}$$

It will be evident from the above example that the rule which applies in percentage problems of Case I is, *Multiply the base by the rate*

Solve the following examples, the first ten orally, the others with paper and pencil

What is—

- 1 5% of 200?
- 2 50% of 12 oranges?
- 3 25% of 400 yards?
- 4 $3\frac{1}{2}$ % of 64 bushels?
- 5 7% of 80 cows?
- 6 $33\frac{1}{3}$ % of \$750?
- 7 $62\frac{1}{2}$ % of 240 acres?
- 8 $8\frac{1}{2}$ % of 96 apples?
- 9 20% of 1200 Sheep?
- 10 6% of 90 feet?
- 11 John has 64 marbles, James has $37\frac{1}{2}$ % as many. How many has James?
- 12 Mary earned \$2.40, she spent 10% for ribbons, 6% for candy, and 4% for pencils. How much did she spend?
- 13 A flagstaff is 72 feet high. How high is a flagstaff that is 75% as high? One 25% as high?
- 14 A man owned 1,000 acres of land and sold $62\frac{1}{2}$ % of it. How much did he have left?
- 15 Mr. A paid \$450 for dry goods. He sold them at a gain of 27%. How much did he gain?

Exercises under Case II. This is the case in which the rate and percentage are given and the base is to be found. In the problem discussed first under Case I we were asked to find 8% of 500. We found it by two different forms of solution to be 40. 40 is a certain part of 500, for it is the same as 8% of 500. Then is it not clear that the percentage, 40, and the rate, 8, exactly equal each other? Let us apply that truth to problems under Case II, in which the rate and the percentage are given and in which we are to find the base. Remember that the base is still 100%, or the whole.

25 is 20% of what number?

We are to find 100% and we know that 20% of it is 25. Let us solve this problem by the analytical method

20% of some number	=25
1% of that number	= $\frac{1}{20}$
100%, or the whole number,	=125

All problems of this class, no matter how complicated they may at first appear, may be solved by this analytical form. The usual method used in the arithmetics follows this rule: *Divide the percentage by the rate, expressed decimally*

Solve the following problems, as many of them by the analytical and fractional methods as possible, the others by the usual arithmetical rule. By the fractional method the first problem below is easily solved. 20% is $\frac{1}{5}$ of the whole. Then if 18 is $\frac{1}{5}$ of the whole, $\frac{5}{5}$ of the whole would be 5×18 , or 90.

Find the number of which—

- 1 18 is 20%.
 - 2 230 is 75%.
 - 3 24 is $8\frac{1}{2}$ %.
 - 4 81 is 9%.
 - 5 770 is 11%.
 - 6 18 is 90%.
 - 7 345 is $12\frac{1}{2}$ %.
 - 8 276 is 40%.
 - 9 375 is $62\frac{1}{2}$ %.
 - 10 421 is $16\frac{2}{3}$ %.
 - 11 An agent was to receive a commission of 4% for purchasing goods for a merchant, his commission amounted to \$36. How many dollars' worth of goods did he buy?
 - 12 In selling a store at an advance of 10%, Mr. B made \$400. How much did the store cost him?
 - 13 John had a certain sum of money in the morning. He found at night that he had lost \$51, or 17% of it. How much did he have in the morning?
 - 14 Mr. Brown lost \$30 by selling a quantity of apples at 6% below cost price. How much had the apples cost him?
 - 15 In selling a house for \$5,625, Mr. Gray made $12\frac{1}{2}$ % per cent. Find the original cost of the house.
- This problem differs from any that we have had before, \$5,625, the sum for which the house was sold, is the base plus the percentage—that is, the amount. To find the base, divide this amount by, $1 + \text{the rate} = 1.125$

Exercises under Case III. This is the case in which the base and the percentage are given and the rate per cent is to be found. Keep in mind the fact that the base is always 100%, and that the percentage is such a part of the base as is indicated by the rate per cent. Let us analyze the following problem

10 is what per cent of 30?

30 is the entire amount or the entire number, and is 100%. 10 is a certain part of 30 and we are required to find that part. 30 equals 100%. If 30 equals 100%, 1 equals $\frac{1}{30}$ of 100%, or $3\frac{1}{3}\%$. If 1 equals $3\frac{1}{3}\%$, 10 would equal $10 \times 3\frac{1}{3}\%$, or $33\frac{1}{3}\%$.

There is another simple way of solving this problem. 10 is $\frac{1}{3}$ of 30, and if the whole number is 100%, then $\frac{1}{3}$ of 100%, or $33\frac{1}{3}\%$, will represent the relation between 10 and 30.

From this we may make the general rule
To find the rate divide the percentage by the base

Solve the following problems

What per cent of—

1 60 is 20?

2 90 is 30?

3 96 is 8?

4 216 is 36?

5 72 is 6?

6 A lawyer collected \$466 for a firm, and received for his services \$23.30. At what rate was he paid for making the collection?

7 Mr. Brown bought a house for \$6,000 and sold it for \$7,000. What was his gain per cent?

The applications of the principles of percentage in practical arithmetic are numerous. Commission, Trade Discount, Taxes, Insurance, Stocks and Bonds—all of these subjects have as their basis the simple principles of percentage which have been discussed. To sum up, there is no more vital element in arithmetic, and later in the business world, after pupils have mastered the fundamentals of addition, subtraction, multiplication, division and fractions, than percentage. Indeed, in many applications percentage supplants to a large extent the use of fractions, while one thinks in terms of fractions he translates into percentage forms, and *vice versa*. In school the teacher must direct the youthful mind to understand this intimate relation, in the home the same care should be exercised.

PERCEPTION, the mental process by which we interpret impressions received through the senses. Perception is a complex act, which includes sensation. Sensations grow into perceptions, and the relation between sensation and perception is so close that we cannot find a clear line of separation between the two kinds of acts. When you look at a piece of iron, you not only see a bar that is long and grey, but you perceive also its coldness, its hardness, its

inflexibility, its heaviness, that is, not only are the light waves striking your eyes transmitted to your brain, but you interpret the resulting sensations according to your previous experiences in similar situations. The visual sign recalls a host of associated qualities. This process of adding to basic sensations the organized related ideas from past experience is perception. When for some reason we make a wrong interpretation of a sensory impression—as when, feeling hungry, we say, "There's the dinner-bell," when it was only the neighbor's door-bell,—the mistake is called an illusion. Sometimes we even go so far as to think we have heard the bell when there was no sound whatever. Such an extreme instance of mistaken perception is called an *hallucination*. Correctness of perception is the first step toward judgment and sound reasoning.

Cultivation of Perception The power of perception is one of the earliest powers developed and is synonymous with the power of observation. The child can be greatly assisted in developing this power, if parents and teachers will adhere to a few simple principles. These are

(1) The cultivation of perception is coincident with training of the senses. This training should receive careful attention during childhood and youth, the periods, in which these powers are the most active.

(2) Attention is essential to perception, and attention depends upon interest. If the child is brought in contact with his surroundings in such a manner as to have them appeal to his curiosity he readily gives attention to those things that interest him and gains ideas for himself.

(3) Only a very small part of a sensation is perceived at one time, hence, complete perception requires frequent repetition.

(4) Complex ideas are perceived gradually only a part of the idea being retained with each impression. As the proper relations become established, the idea develops in the mind and finally assumes its true relation. To attempt to force this development or to expect the immediate perception of complex ideas by children leads to memorizing facts which have no meaning, and dwarfs the reason.

(5) Clear ideas are obtained only by careful observation of simple things or acts. Too many objects, the attempt to grasp too many things at once, or the use, with young children, of objects which are complex, tends to the confusion of ideas.

(6) Illusions often arise from prepossessed ideas. One thinks he sees what he expects to see, as more than half of an orange the back side of a cube, when impartial observation shows that this is impossible.

(7) Right preparation of the mind is a great aid to perception. The skilful teacher prepares her pupils to receive the new ideas which she is to present by carefully leading up to them in such a manner as to cause the pupils to anticipate what the new lesson contains.

(8) Observation means careful, systematic looking at things. While some possess this power to a greater extent than others, it is perfected only by training.

(9) The perceptive powers should be so trained as to make them first accurate, then quick. Pupils whose powers of observation have been thus trained during the first years of their school life will readily appreciate the beauties of nature, literature, music and art.

Related Articles. Consult the following titles for additional information:
 Apperception Interest
 Attention Psychology
 Concept Sensation

PERCH, *perch*, a large family of nearly 125 species of fresh-water fishes, found both in America and Europe. The best-known species is the *river*, or *yellow*, perch, common in the streams and lakes from New England and New York to the upper Mississippi Valley. The perch is a small fish, seldom exceeding a pound in weight, with elongated body and small, rough scales, and is easily caught by hook and line. Its flesh is highly esteemed, but the perch is not considered as valuable as numerous other species because of its large number of bones.

PERENNIALS, *per en' als*, plants which live more than two years. They include two groups, the first comprises trees and shrubs, the second herbaceous plants such as the potato, which blooms and bears year after year. The word is sometimes applied to herbs only the roots of which are perennial, the parts above ground dying down in winter. As a rule, however, the term is used to designate such plants as shrubs, which live from year to year. Plants that live but a year are called *annuals*; those that live two years are *biennials*. Many plants, perennials in their native habitat, when taken to cold regions die in winter, becoming *annuals*.

PERFUMES, treasured by femininity the world over since time immemorial, are substances prepared for personal use because of their pleasing odor. Perfumes of various sorts in the form of incense were used in religious ceremonies in the most ancient times. Perfumes are classified as *animal*, *vegetable* and *artificial*.

Animal Perfumes—Manufacture and Use. The animal odors are musk, civet, ambergris,

castor and such vegetable perfumes as are obtained in the form of essential oils. These are of great value because of their permanence and penetrating power. In concentrated form they are very strong, and their preparation requires great skill. The original substances are soaked, or macerated, in alcohol to form tinctures, and are used in small quantities in the preparation of the perfumes.

Vegetable Perfumes—Manufacture and Use. There are many vegetable perfumes. The most delicate are extracted from the blossoms of odor-bearing plants. The most expensive perfume on the market at present is the oil of rose petals, or *attar of roses*. In making this perfume, the blossoms are taken from a bushy variety of the damask rose and from the white musk rose. The flowers are gathered in the latter part of May, and as soon as picked are taken to the distillery and placed in large, cool cellars. About twenty-five pounds of fragrant blossoms are put into a tinned copper still, water is added and a fire is started in the immature furnace underneath. When about one-fifth of the contents has been drawn over through a water-cooled worm, the still is emptied and recharged, and the process is repeated until all the harvest of roses has been used. The first product is simply rose water. This rose water is returned to the still, and about one-third of its bulk of second rose water is drawn over. Throughout this liquid, there are scattered little globules of a precious, fragrant, oily *attar*. The distilled water is now put into bottles, and the oil gradually comes to the top and is dipped out with a spoon. Thus *attar* is worth about \$50 to \$100 an ounce.

Nearly all the ordinary perfumes are made by a process known as *enfleurage*. This consists in placing freshly gathered flowers in a glass case, the lid of which has been daubed with lard to the depth of half an inch. In the course of a day the lard absorbs all the essential oils in the flowers, and they are replaced by fresh ones. When fully charged, the lard is scraped off, melted and combined with alcohol, which brings the volatile oil to the surface. It is then skimmed off and filtered and is ready to be bottled and shipped. The waste leaves from the process are used as fertilizers.

Artificial Perfumes. The manufacture of artificial perfumes has developed into an in-

dustry of great importance. The perfumes of commerce consist of various combinations of the animal, vegetable and artificial perfumes dissolved in alcohol and water.

The manufacture of perfumes is now chiefly carried on in Paris and London and in various towns near the Mediterranean, especially in the south of France. Districts are famous for certain productions. Cannes is noted for its perfumes of the rose, tuberose, orange blossoms, cassia and jasmine, Nîmes, for thyme, rosemary, and lavender, Nice, for the violet and mignonette. England claims superiority for its lavender, which is cultivated upon a large scale in Surrey. Turkey and Bulgaria are noted for their attar of roses.

PERICARDIUM, the conical sac which encloses the heart and a small part of the large blood vessels. It consists of two membranes, an outer fibrous membrane and an inner serous membrane which completely envelops the heart and secretes a fluid that lubricates it. The outer membrane is formed of closely interlacing fibers, which at the upper end interweave with the fibers of the outer coats of the large blood vessels, forming a closed sac. At its broad lower end the pericardium is attached to the upper surface of the diaphragm. In rheumatic fever the pericardium is likely to become inflamed.

PERICLES, *per'ikleez* (495-429 B. C.), the most celebrated statesman of ancient Greece. Born of a prominent family, naturally endowed with intellect and good looks, and educated by the foremost scholars of his day, he had little difficulty in attaining to political leadership. At the time he entered on his public career Athens was on the threshold of a new day. Although power was in the hands of the aristocracy, the germs of democracy were in the minds of the people. Pericles announced himself at once a friend of the people. When Cimon, the leader of the aristocracy, died, Pericles became virtual ruler of Athens (449 B. C.), wrought a complete change in its administration and thoroughly democratized it.

Before he came into power only members of the aristocratic class were eligible for the higher offices of government, Pericles made citizenship the sole requisite for such offices. He transferred the power of the Areopagus, till then the leading court of Athens, to the Senate, the popular assembly. He instituted the custom of paying salaries to public of-

ficials. Because he believed in the educational value of the theater, he made attendance possible for all who could not pay for admission. Ambitious to make Athens the most glorious city of Greece, he began to embellish it with beautiful public buildings and with sculpture. The temple of Athena Nike, the Propylaea and the Parthenon, the crowning achievement of Greek architecture, were built under his guidance. All artistic activity received a powerful stimulus, sculpture and philosophy flourished, a period of unprecedented prosperity set in, and Athens experienced the most brilliant period in its history.

It was Pericles' ambition not only to make Athens the chief center of Greek culture and prosperity, but also to extend its power over the other Greek states, ultimately he hoped to form a confederacy under the leadership of Athens. To this end he reduced Naupactus and Aegina, subdued Samos and won back Euboea. The wealth and expansion of Athens aroused the jealousy and fear of the Peloponnesians, and the Peloponnesian War was the result. While in the throes of this disastrous conflict, Athens was attacked, in 430 B. C., by a terrible plague, and hundreds died. Crazy by superstition and despair, the people blamed Pericles for their condition and deposed him. But there was no one to take his place, and he was recalled. Soon afterwards, however, in 429 B. C., he himself fell a victim to the disease and died. The death of Pericles closed the greatest period in Greek history, for there was no one to succeed him, and Athens steadily declined.

PERIGEE, *per'ijee*, an astronomical term, derived from the Greek words meaning *near* and *earth*, and used to designate that part of the orbit of the moon which is nearest the earth. When the moon, in its irregular revolution about the earth, comes closest to that planet it is said to be *in perigee*.

PERIPATETIC SCHOOL OF PHILOSOPHY, the system of philosophy of Aristotle and his followers, so called, it is believed, because he was accustomed to walk up and down with his more intimate disciples, while he expounded to them his doctrines. Practical philosophy is divided by Aristotle into ethics, economics and politics. According to his ethical system, the highest good is happiness, which depends on the rational or virtuous activity of the soul throughout life. Virtue is proficiency in willing what is conformed to reason. All virtues are either

ethical or intellectual. The former include justice, or righteousness, generosity, temperance and bravery, the first being the highest. The intellectual virtues are reason, science, art and practical intelligence. For the attainment of the practical ends of life, it is necessary for a man to live in society and form a State.

The Peripatetic School continued at Athens uninterruptedly till the time of Augustus. Those who proceeded from it during the first two or three centuries after Aristotle's death abandoned, for the most part, the metaphysical side of his teaching and developed chiefly his ethical doctrines or devoted themselves to the study of natural history. No other one of the philosophical schools of antiquity maintained its influence so long as the Peripatetic. See ARISTOTLE, PHILOSOPHY.

PERITONEUM. See ABDOMEN.

PERITONITIS, inflammation of the serous membrane lining the abdominal cavity. It is a serious and not uncommon disease. Chills, severe pain in the abdomen, difficult and painful breathing, and vomiting are the common symptoms of acute peritonitis. Sometimes the attack may be checked in the beginning by the use of ice bags and the administration of a purgative. The patient must lie entirely inactive.

PERJURY, *per'ju-ri*, in law, the offense of deliberately giving false testimony in a judicial proceeding after having sworn to tell the truth. If a witness unintentionally makes a statement contrary to fact he is not held guilty of perjury; but if he knowingly swears to a lie upon an issue under trial he is subject to the punishment which the law attaches to the offense. To incite or force another to commit perjury is called *subornation of perjury*. Technically, perjury is generally treated as a *misdeemeanor*, and is punishable as such, in some jurisdictions it is classified as felony. In the United States, Canada and England perjury is punished with fine or imprisonment, or both. See FELONY, MISDEMEANOR.

PERMANENT COURT OF INTERNATIONAL JUSTICE. This court, generally referred to as the "World Court", was created by an international agreement concluded at Geneva, Dec 16, 1920. More than 40 of the 52 original signatories to the protocol have ratified the agreement, including all the principal powers, with the exception of the United States.

The court consists of eleven judges and four deputy judges, elected for terms of nine years. It holds regular annual sessions, and makes its own rules of procedure. Not more than one judge from any one state at one time may be a member of the court. Only States or members of the League of Nations may bring cases before the court. The official languages of the court are French and English. The judges of the court are elected by the Council and Assembly of the League of Nations, from a list of candidates nominated by the Court of Arbitration at The Hague. Three Americans have been elected judges in the court by this method—John Bassett Moore, Charles Evans Hughes and Frank B. Kellogg, the last resigning in 1935, because of ill health.

PERMIAN, *per'mi-an*, **PERIOD**, a division of geologic time, the last of the Paleozoic Era. It followed the Carboniferous Period and preceded the Triassic. In this period there were tremendous geographic changes over the face of the earth, gigantic upheavals of the sea bottom which resulted in new land areas. India, Africa and Australia were largely covered with ice. The rocks of the period are chiefly sandstone and shale. These contain few fossils. The plants consisted of ferns and cone-bearing trees, the latter the precursors of the sequoia. Reptiles appeared in the course of the period and before the end of it outnumbered the amphibians. Imprinted upon the rocks are the impressions of gigantic lizard skeletons ten feet long. In South Africa, where animal life in this period was more highly developed than in other quarters, have been found among the Permian rocks indications of a missing link between the reptiles and mammals. See GEOLOGY.

PERNAMBUCO, *per nam boo'ho*, **BRAZIL**, capital of the state of Pernambuco, on the Atlantic coast. The name Recife is often applied to the city, and this is also the name now given to the oldest part of the city, other parts are called Sao Antonio, which is on an island, and Boa Vista, on the mainland. Recife is the principal seat of business, Sao Antonio has most of the public buildings, and Boa Vista is the fashionable residence quarter. The harbor of the city is protected by a reef, which encloses a belt of water about a mile in breadth. Many of the buildings of the city are worthy of note. The trade is extensive. The principal exports are

sugar, cotton, dyewoods, rum, alcohol and hides. The manufactures include cotton, machinery, glass and leather, but they are not yet of great importance. Pernambuco is now the third largest city in Brazil and the second in point of commercial importance. It was founded by the Portuguese in the sixteenth century and from 1630 to 1654 was in the hands of the Dutch. Population, 1933, estimated, 438,159.

PEROXIDE OF HYDROGEN See HYDROGEN DIOXIDE

PERPETUAL MOTION, motion which never ceases. There have been many attempts to make a machine which will run continuously by the power it creates. The idea rests on a false notion, for energy cannot be created (see ENERGY). To illustrate, the water of a creek may be impounded and used to operate an electric dynamo whose current may be transformed into light, heat or power to operate other machinery, but the dynamo cannot create the power to operate itself.

PERRAULT, *peh ro'*, CHARLES (1628-1703), a French writer of fairy tales, to whom the world is indebted for modern versions of *Cinderella*, *Little Red Riding Hood*, *Puss in Boots*, *Sleeping Beauty* and many other fascinating tales. Perrault was born at Paris and educated at the College of Beauvais. He practiced law for a short time and afterwards devoted himself to literature. In 1697 he published his book of stories and called it "Mother Goose." These stories are old French folk tales which had a verbal existence for centuries before he collected and put them in literary form, having passed down from generation to generation by word of mouth among the French peasantry. They are among the choicest of fairy tales. A good adaptation for English readers has been made by Andrew Lang and called *Popular Tales*.

PERRY, BLISS (1860-), an American editor and author, who since 1907 has occupied the chair of belles-lettres (English literature) at Harvard University. He was born at Wilhamstown, Mass., and educated at Williams College and in the universities of Berlin and Strassburg. In 1881 he became an instructor in Williams College, and in 1886 was appointed professor of English in that institution. In 1893 he was called to a similar position in Princeton University, where he remained until 1899, when he be-

came editor of the *Atlantic Monthly*, holding the position for ten years. The chair in Harvard to which he was chosen in 1907 was formerly occupied by Longfellow and Lowell. In 1909-1910 he represented Harvard as special lecturer at the University of Paris.

Professor Perry is regarded as one of the foremost literary scholars and writers in America, and is widely known as editor of the Cambridge edition of the poets and as editor of *Little Masterpieces*. He has written many essays and magazine articles pertaining to his chosen field of labor, and is the author of *Salem Kitteridge*, and *Other Stories*, *The Powers at Play*; *A Study of Prose Fiction*, *Walt Whitman*; *Whittier*; *The American Mind*, and *Thomas Carlyle: How to Know Him*.

PERRY, MATTHEW CALBRAITH (1794-1858), an American naval officer, brother of Oliver H. Perry. In 1852 he accomplished his most notable service, in command of an expedition to Japan, where he succeeded in negotiating the treaty by which that country entered into commercial relations with other nations. Perry was the first American to circumnavigate the globe.

He was born at Newport, R. I., entered the navy at the age of fifteen and served during the War of 1812. After engaging for a time in mercantile service, he reentered the navy and was given command of unimportant expeditions against West Indian pirates. He was promoted to the rank of commander in 1826 and, in charge of the Brooklyn Navy Yard, superintended the construction of the *Fulton*, the first steam vessel in the United States navy. He was placed in command of the vessel when it was completed and in 1841 was made commodore and was assigned to command of the fleet for the suppression of the African slave trade. He commanded for a time the American fleet in the Mexican War.

PERRY, OLIVER HAZARD (1785-1819), an American naval officer, born at South Kingston, R. I. He is famous chiefly for his defeat of a British force on Lake Erie in 1813. Perry, who had nine vessels, with fifty-four guns and four hundred ninety officers and



MATTHEW C.
PERRY

men, fought six vessels, with sixty-three guns and about four hundred sixty officers and men. He lost four-fifths of the crew of his flagship, but finally won a complete victory which he announced in the brief dispatch,

"We have met the enemy and they are ours—two ships, two brigs, one schooner and one sloop." Perry was rewarded with a gold medal and the rank of captain. He died of yellow fever in Trinidad and was buried



OLIVER HAZARD
PERRY

there, but some years later his body was carried to Newport, R. I., where there is a bronze statue of him.

PERRYVILLE, BATTLE OF, a battle fought at Perryville, Ky., October 8, 1862, between a Federal force of 22,000, under General Buell and a Confederate force of 17,000, under General Bragg. The Confederates opened the battle with an attack upon the left wing of the Federal army, under McCook, and were at first successful, but were finally driven back. They retired during the night. Though in many respects a drawn battle, this engagement was practically a victory for the Federals. The Confederate loss was about 3,500, while the Federal loss was about 4,200.

PERSEPHONE, *per-sef'one*. See **PROSERPINA**.

PERSEPOLIS, the ancient capital of Persia, and a magnificent city in the time of Darius I. It was situated in a fertile valley about thirty miles northeast of the modern city of Shiraz. In 331 B. C. it was conquered by Alexander the Great, and by him partly demolished. Later another city was built on its ruins, but this also was destroyed. The remains of huge marble columns, massive walls and sculptures are evidence of the magnificence of the early city.

PERSEUS, *pur'seus*, an ancient Greek hero, son of Jupiter and Danae. When he was sent by Polydectes, king of the island of Seriphos, on a quest to kill the Gorgon Medusa, he was aided by Mercury, who loaned him his winged sandals; by Minerva, who furnished him with her magic shield, and by Pluto, who supplied a helmet which

made him invisible. So safeguarded, Perseus flew to a land of perpetual darkness, the home of the Graeae, three sisters who had among them one tooth and one eye, and who alone possessed the secret of the dwelling place of Medusa. Perseus succeeded in securing their single eye, which he returned to them upon receiving the information he sought. He flew to Medusa's home and cut off her head, and holding it far above his sight, he flew away with it. From the drops of blood which dripped into the ocean, Neptune fashioned his steed Pegasus.

After various adventures, chief of which were the rescue of Andromeda from a sea monster and the transformation of Atlas into a mountain, by showing him the Gorgon's head, Perseus arrived in Seriphos. Finding that his mother had been persecuted by Polydectes, he revenged himself by showing the king the Gorgon's head, which turned him to stone. With his mother and his wife, Andromeda, he then returned to Argos. One day, while engaged in a game of quoits, he accidentally killed his grandfather Acrisius, king of Argos, thus fulfilling an early prophecy. Upon his death the gods placed Perseus as a constellation in the heavens.

PERSHING, *pur'shing*, JOHN JOSEPH (1860-), an American military leader, commander in chief of the expeditionary forces of the United States during the World War, and the first American officer to command American soldiers on European soil. Pershing was born in Linn County, Missouri, and is a graduate of the Kirksville normal school in that state. In 1886, the year of his graduation at West Point, he entered the regular army as a second lieutenant of cavalry, and saw active service in the wars with the Apaches and the Sioux. The outbreak of the Spanish-American War (1898) found him an instructor in tactics at West Point. He immediately offered his services to the government, had an active part in the Santiago campaign in Cuba, and after the conclusion of peace was sent to the Philippines, where he remained until 1903. While in the Philippines he was the organizer and first chief of the Bureau of Insular Affairs, and subsequently was appointed military governor of the islands. After an interval in which he served as military attaché at Tokyo, he was promoted to the rank of brigadier-general (1906) and later acted as governor of Moro province,

P I In making him brigadier-general President Roosevelt promoted him over the heads of 862 officers

Pershing was placed in command of the Eighth Brigade of the regular army on his return to the United States, in January, 1914, and he was temporarily stationed at El Paso, Tex., to guard the Mexican border. When the raid on Columbus, N. M. (1916) made stronger measures necessary, he led the punitive expedition into Mexico (see *MEXICO*, subhead *History*). In February, 1917, General Funston, who was Pershing's superior, died, and President Wilson nominated Pershing to succeed him. He remained in command of all the troops on the border until early summer, when he proceeded to France to assume command of the American forces.

After Pershing's arrival in Europe he was raised to the rank of general. He co-operated splendidly with the other allied officers, showed himself a leader and organizer of first rank, and won high regard at home. In 1923 he was made chairman of the American Battle Monument Commission, in charge of the American soldiers' cemeteries in France. In 1925 he was sent to Chile to head the Tacna-Arica territorial commission, but he could not bring the disputants to terms. After the war his most important home service was in the post of chief of staff of the army, 1921-1925.



Carpet weaver

PERSIA, *pur'sha*, or *pur'zha*, a very old monarchy in Southwestern Asia, in ancient times the nucleus of a mighty empire that stretched from the Indus River to the Mediterranean Sea, and then known as *Iran*. In 1935 the name Persia was abandoned, and the official designation Iran was restored. Even to-day the figures representing its dimensions and area are somewhat impressive, but

in world affairs it is of minor importance. A considerable part of it is desert, the country extends 700 miles from north to south and 900 miles from east to west, covering an area of 628,000 square miles. It touches Transcaucasia, the Caspian Sea and the Turkmen republic on the north, Turkmen, Baluchistan, and Afghanistan are on the east, the Persian

Gulf and the Arabian Sea are south, and the Gulf and Iraq are on the west. The population is estimated at 10,000,000, there are, on the average, about sixteen persons per square mile. The inhabitants have always called this country Iran, and though that is again its legal designation, it will long be known to the unofficial world as Persia.

In 1907 Great Britain and Russia entered into an agreement regarding "spheres of influence" in Persia. Each nation was to control the Persian provinces adjoining its possessions, that is, Russia was to be dominant over 305,000 square miles in Northern Persia, and Great Britain over 137,000 square miles in the southeast. The integrity and independence of the country were to be respected by the two powers, but they reserved the right to control its finances should occasion arise. In January, 1918, the Bolshevik government of Russia formally renounced the agreement and on May 2, the same year, the Persian government declared it null and void.

The People The Persians constitute the most important group of the Iranian branch of the Aryan race, and to-day they represent a mixture of Mongolian, Tartar, Arab and Turkish elements. The town and city dwellers and the settled agricultural population have developed a typical civilization along Oriental lines, in the mountainous districts there are nomadic tribes of herdsmen living under very primitive conditions. About nine-tenths of the people are Mohammedans of the Shiite sect, and there are besides about 850,000 Mohammedans of the Sunni sect, which is dominant in Turkey. Parsees, Jews, Armenians and Nestorians are also represented in the population.

Government and Education In government Persia is an hereditary monarchy, the ruler of which bears the title of shah, or sultan. There is a Cabinet of eight Ministers. The country is divided into twenty-six provinces, administered by governor-generals appointed by the shah, under these are subordinate governors and town chieftains. The nomad tribes, however, are under the rule of their own chiefs.

Persia has a national system of education, but until within recent years it was such in name only. In this intensely Mohammedan country, instruction consisted largely in teaching children to read the Koran. To-day education on the Western basis is gaining recognition, religious instruction is being sup-

planted by an educational program that is rapidly reducing a large illiteracy. Schools in the street where the Koran is the textbook are still found everywhere, but Persian youths are able to study by modern methods in many schools taught by intelligent natives and many foreigners. The number of schools increased from 600 to nearly 4,000 in the ten-year period ending in 1934.

Surface and Drainage Persia is an elevated plateau, broken by clusters of hills or chains of rocky mountains, which alternate with extensive plains and barren deserts. Low tracts occur along the Persian Gulf and the Caspian Sea. The interior plains have an elevation of from 2,000 to 6,000 feet above the sea. This vast central plateau is supported in the north and south by two great mountains systems, and from these all the minor ranges seem to spring. The northern chain, an extension of the Hindu Kush, enters Persia from Northern Afghanistan and reaches its greatest elevation south of the Caspian, where it takes the name Elburz Mountains and attains, in Mount Demavend, a height of about 18,500 feet. The other great mountain system runs from northwest to southeast nearer the Persian Gulf, is of considerable width and forms several separate ranges. The rivers are few and insignificant. None is of any navigable importance except the Karun, recently opened to the navigation of the world. There are a great number of small fresh-water lakes, and a few very extensive salt lakes, the largest being Urumiah, in the extreme northwest.

Climate. The climate varies considerably in different provinces, and in the central plateau intense summer heat alternates with extreme cold in winter. The shores of the Persian Gulf are scorched in summer, those of the Caspian Sea, especially the parts covered with dense forest, are humid and infested with malaria.

Mineral Resources The mineral resources of Persia are rich but little developed. Iron, copper, lead and antimony are abundant, sulphur, naphtha and rock salt are found, and coal is worked near Tabriz. The turquoise mines of Nishapur are profitable, and oil resources are developing.

Production and Industry. Only a small proportion of the arable land is under cultivation, and farm implements used are very simple. Nevertheless, wheat, barley and rice are raised in large quantities, as are peas,

beans, lentils and millet. Enough cotton, of the short-staple variety, is produced for export. In the Caspian provinces silk is an important product, supplying Ispahan and other centers of silk manufacture. Tobacco of high quality is produced in sufficient quantities to supply a great home demand and maintain a considerable export trade. Of increasing importance are the opium industry and the production of tragacanth and other gums. Conditions favor an extensive cultivation of the opium plant, or poppy. Indigo, grown in the southwestern provinces, is a profitable source of dyestuff. Persia also produces a wide variety of fruits, including melons of superior quality and dates of excellent flavor.

The country produces horses of fine breed, camels, mules and sheep. Wool of a quality approaching that of Cashmere is used in home manufacture and exported. Of especially high grade is Persian lamb skin. There are no factories in the country in the modern sense of the term, but fancy articles and textile goods are made in large quantities in private shops, homes or trade schools. The most important manufacture is the famous Persian carpet, or rug. There are numerous varieties, all made by hand and each having an individual design. Woolen shawls made of goat's hair are also a profitable line of manufacture.

Communication and Commerce. In 1888 a railway six miles long was opened from Teheran to Shah Abdul-azim, a suburb. In March, 1916, a railway constructed by a Russian company was opened between Julfa, on the Russian frontier, and Tabriz. A new railroad from Teheran to the Persian Gulf was opened for 200 miles of its course in 1934. Special attention has been given to motor roads, and many now reach from the capital city to all parts of the country, but they are blocked by snow in the north for three months each year. There is considerable foreign commerce by sea from Caspian Sea and Persian gulf ports. The latter will gain trade with the completion of the railroad.

Tabriz, Teheran, Hamadan and Ispahan are the chief trading centers. Interior trade is carried over the caravan routes, which, unfortunately, are subject to bandit raids. On the Caspian Sea and the Persian Gulf there are a number of ports visited by foreign vessels. Trade is carried on with China, Turkey,

India, most of the European countries and the United States, but previous to the Russian revolution Russia had the largest share Persian exports to the United States consist largely of carpets

History From the most ancient times of which we have any record the Persians have inhabited the southwestern part of the plateau of Iran, anciently known as Persis In the ninth century B C they were first conquered by the Assyrians and forced to pay tribute In 660 B C, when the Assyrians were overcome by the Medes, the allegiance of Persia was transferred to Media

About 550 B C Cyrus the Great conquered the king of Media, and Persia became the mistress, instead of the vassal, of Media From this time on, the Medes and Persians are spoken of as one people Cyrus continued his conquests and built up an empire which extended from the Oxus and Indus to the Mediterranean He was succeeded by his son, Cambyses II (529-522 B C), who subdued Tyre, Cyprus and Egypt Darius I, who ascended the throne in 521 B C, organized the kingdom and divided it into twenty states, each governed by a satrap, who was appointed by the king The capital of the empire was fixed at Susa The Grecian colonies in Asia Minor had fallen into the hands of Cyrus, and it was Darius's plan to subjugate the mother country To this end he sent two great expeditions against the Greeks, but they were both fruitless, the second ending in his defeat at the famous Battle of Marathon (490 B C) Darius died in 486 B C and was succeeded by his son, Xerxes I, who carried on his father's plans against Greece Assembling over a million soldiers, he marched at their head to the Hellespont At the pass of Thermopylae his march was checked by the Spartan Leonidas, with 7,000 Greeks Leonidas and all his men fell at the hands of the Persians, and Xerxes advanced successfully to the plains of Greece Nothing but defeat awaited him there, and the battles of Salamis, Plataea and Myeale banished all hopes of Persian supremacy in Europe

Persian history during the next century is a record of internal strife The most noteworthy event was the attempt of Cyrus the Younger (401 B C) to seize the throne of his brother Artaxerxes Finally, in 330 B C, the empire fell before Alexander the Great After his death, Persia passed suc-

cessively into the hands of the Seleucidae, the Sassanians, the Arabs and the Seljuks The dynasty of the Seljuks was swept away by the Mongols under Genghis Khan, in A. D. 1223 His grandson Hulagu Khan founded the Perso-Mongol dynasty, which, in 1380, gave way before Timur (Tamerlane) the Tartar After Timur's death the Turkomans were masters of the country for about a hundred years

In 1500 Ismail Safi, who pretended to be descended from Ali, the son-in-law of Mohammed, at the head of the force of Turkish tribes overthrew the Turkomans and made himself ruler of Persia, assuming the title of shah Shah Ismail and his descendants were constantly obliged to protect Persia from the sultan of Turkey In 1795 Agha Mohammed, a Turkoman, founded the present dynasty of Persian rulers In 1797 Agha was succeeded by his nephew, Futeh Ali, who, soon after his accession, became involved in a war with Russia By the Treaty of Gulistan (1813), Persia ceded several provinces to Russia and granted that country the right of navigation in the Caspian Sea In 1826 another Russian war broke out Persia again defeated and was compelled to cede Armenia to Russia Futeh Ali died in 1834 and was succeeded by his grandson Mehemet Shah, during whose reign the country grew constantly weaker and came more and more under Russian influence

When, at Mehemet's death in 1848, Nasr-ed-Din came to the throne, he found the country in confusion, but he established himself firmly and planned a policy of expansion Against the Turkomans and several neighboring tribes he was successful, and he asserted the claims of Persia in Afghanistan and Baluchistan The English government objected to this expansion of territory and compelled him to sign an agreement not to interfere in the affairs of these countries, putting a stop to whatever thoughts of further conquest he may have entertained In 1896 he was fatally shot by a religious fanatic and was succeeded by his son, Muzaffar-ed-Din Muzaffar-ed-Din did away with the office of grand vizier and, assuming control of his cabinet of twelve ministers, at once proposed energetic reforms, some of which were carried out The taxes on foods were reduced, the civil service was reformed, and revolts and conspiracies were sternly repressed.

In 1906 a strong demand for a constitutional parliamentary government resulted in the call for a national assembly. This body convened in Teheran on October 7, 1906. Soon after this, Muzaffar-ed-Din abdicated, and in 1907 his son, Mohammed Ali, was crowned shah. A new constitution was granted giving Parliament control of finances. Trouble arose between the assembly and the shah, and ere long the country was plunged into a civil war. The parliamentary party, or Nationalists, won, and in 1909 the shah was deposed and exiled. On July 17, his son, Ahmed Mirza, a child of seven was proclaimed shah under the regency of a prominent Nationalist.

Meanwhile, in 1907, the Anglo-Russian agreement for the economic partition of Persia had been consummated. Russia used its power against Parliament, and stirred up all sorts of internal disorder. On the recommendation of Mr. Taft, President of the United States, W. Morgan Shuster was given charge of financial matters in 1910. His wise administration and just collection of taxes created dissatisfaction among the wealthy Persians, who preferred the old policy of bribery, and under pressure from Russia Shuster was compelled to resign. He was succeeded by a Belgian selected by Russia and Great Britain. The Belgian treasurer-general resigned in 1914, and the same year the regency was abolished.

During the World War, Parliament ceased to function regularly, but good order in general prevailed. At the close of the war, it asked for freedom to manage its own finances, but its credit was low, and an American Financial Adviser was placed in charge in 1922, and remained until 1925. Political unrest led to a revolt by a powerful faction, and by the coup d'état of 1921, Riza Khan Pahlevi, a military leader, succeeded in getting control. In 1923 Parliament made him Dictator with rank of Prime Minister. Shah Ahmed left the country, and in 1925, Parliament declared him no longer King and conferred the crown on Riza Khan, with the approval and support of the most prominent landowners and business men of the country. Thus ended a dynasty which had ruled Persia almost autocratically since 1779.

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PERSIAN GULF, a gulf separating Persia from Arabia and communicating with the Arabian Sea by the Strait of Ormuz. Its greatest length is 520 miles, its average breadth, about 180. It receives the waters of the united Tigris and Euphrates and of a number of small streams. There are many islands in the gulf, the largest of which are Kishm, Ormuz and the Bahrein islands. In the neighborhood of the latter there are important pearl fisheries.

PERSIAN WHEEL, or **NORIA**, an ancient machine for raising water for irrigation. It consists of a water wheel, with revolving buckets, and is variously constructed and operated. One type of noria is operated in streams. The running water fills the buckets and at the same time turns the wheel, when a filled bucket reaches the highest point, its lower end strikes a fixed obstacle and the water is discharged into a reservoir. In Portugal, Spain, Southern France and Italy, where this wheel is yet extensively used to draw water from ponds and wells, animals supply the motive power.

PERSIMMON, or **DATE PLUM**, a wild fruit tree which bears a tomato-colored fruit of variable size. The American persimmon, which grows in all the Southern states, reaches a height of about sixty feet. The fruit, about the size of a walnut, is pulpy and succulent and contains several oval seeds. Although the fruit of some species matures early, most persimmons are not fit to eat until after the first frost. The Japanese persimmon, a much smaller tree than the American, is one of the principal fruit trees of Japan.

PERSONAL PROPERTY, or **PERSONALTY**, in law, things movable or temporary, as money, jewels, furniture, distinguished from things fixed or immovable, which constitute *real property*, in a general sense, as estates in land and its fixtures. Specifically, in law, the only firm distinction between real and personal property is the disposition after death, the former being inheritable, the latter being at the disposal of the administrator. Title to personal property can usually be transferred by verbal agreement, but real property can be transferred only by written contract. See **CONTRACT**, **REAL PROPERTY**; **DEED**.

PERSONIFICATION, *per sahn i fi la' shun*, a figure in rhetoric used by writers who wish to produce an effect similar to but stronger than that produced by metaphor. In personification life is attributed to objects without life, as in the following:

O, Liberty! What crimes are committed in thy name

Here *Liberty* is addressed as a person, and the presence of life is understood by inference. Personification is closely related to metaphor, in which there is always an implied comparison. It is not always possible to distinguish sharply between the two, as in the expression "angry skies." Here the metaphor could be regarded as personification, as the skies are given a human characteristic. See **METAPHOR**.

PERSPECTIVE, *per spek'tiv*, the art of representing objects upon a plane surface so that they appear as though they themselves were viewed from a given point. Perspective is intimately connected with all art. It is particularly important in the art of drawing and painting, as without correctness of perspective no picture can be entirely satisfactory. The part of perspective which relates to the form of the objects differs essentially from that which teaches the gradation of colors according to the relative distance of objects.

A person looking through a glass window at objects beyond will perceive the shape, size and location of every object upon the glass. If the objects are near the window, the spaces they occupy upon the glass will be larger than those occupied by similar objects at a greater distance. If they are parallel to the window, their shapes upon the glass will be parallel, if they are oblique, their shapes will be oblique. As the person alters his position, the location of the objects upon the window will also be altered. The horizontal line, or line corresponding with the horizon in every position of the eye, will be upon a level with it, that is, will seem to be raised as far above the ground upon which the spectator stands as is his eye.

If the person at the window draws with a pencil upon the glass the figure of an object seen through it, as if the point of the pencil touched the object, he will have a true representation of the object in perspective as it appears to his eye. However, representations of objects generally have to be drawn on opaque planes, and for this purpose rules

have been deduced from optics and geometry, the application of which constitutes what is properly called the art of perspective. See **DRAWING**.

PERSPIRATION, a watery fluid secreted by the sweat glands in the skin. Ninety-nine per cent of it is water, but it contains small quantities of common salt, urea and other salts. Perspiration that evaporates as fast as it forms is *insensible* perspiration, that which appears on the skin in drops is *sensible* perspiration. It is estimated that there are about 2,500,000 sweat glands distributed over the body, and the quantity of perspiration discharged by a healthy person varies from twenty-five to seventy ounces in twenty-four hours.

Violent exercise, extreme suffering and a high temperature increase the quantity of perspiration above normal. Fever which closes the pores of the skin diminishes the quantity. In hot weather the evaporation of perspiration helps to keep the temperature of the body at normal, about 98° F. Perspiration is essential to health, since certain poisonous substances are removed from the system through the sweat glands. As the perspiration evaporates, it leaves a thin film on the skin, which makes frequent bathing necessary.

PERTH, *purth*, WESTERN AUSTRALIA, the capital of the state, situated on the Swan River, twelve miles above its port, Fremantle. It has the range of the Darling Mountains for a background. The chief buildings include a city hall, the governor's palace, a mechanics' institute and an observatory. The city also has barracks and a large park. Population, 1927, including Fremantle and suburbs, 184,223, in the city proper, about 150,000.

PERTH AMBOY, N. J., Middlesex County, fifteen miles south of Newark, on Raritan Bay, at the mouth of the Raritan River, and on the Central of New Jersey, the Lehigh Valley and the Pennsylvania railroads. It was settled by people from Scotland about 1683, on the site of an Indian village called Amboy. They named the place Perth in honor of the Earl of Perth, and the Indian name was added later. It was the capital of the Province of New Jersey up to the Revolution. There is an excellent harbor and considerable shipping, especially of coal. In the vicinity are deposits of fire clay, and the city has extensive shipbuilding yards, large

smelting and refining plants, and brick, and steel works, railroad shops and other factories. One of the largest terra cotta plants in the world is here. The municipality has a Carnegie Library, city hall park, a Federal building, a Y. M. C. A., a hospital and four banks. Population, 1920, 41,707, in 1930, 43,516, a gain of 4.3 per cent.



Typical native types

PERU, a republic in the northwestern part of South America, having a coast line on the Pacific Ocean of about 1,000 miles. It is bounded on the north by Ecuador and Colombia, on the east by Brazil and Bolivia, on the south by Bolivia and Chile, and on the west by the Pacific Ocean. Its length from north to south is about 1,100 miles, its greatest breadth, 700 miles. The boundary between Peru and Colombia is in dispute, and the exact area is uncertain, but it is about 482,000 square miles, or about one-seventh that of the United States.

The People. More than one-half the inhabitants are Indians. About one-fourth are *mestizos*, or people of mixed Spanish and Indian or Spanish and negro blood, and one-fourth are whites who are nearly all Spaniards. There are a few negroes and a few Chinese. The white inhabitants represent the culture of Spain, and the Spanish language is spoken with a purity equalled in no other country in America. The Indians, who are descendants of the original Quichuas, are industrious farm laborers or shepherds. The *mestizos* are engaged in mining, transportation and trading in cattle. Nearly all the inhabitants are communicants of the Roman Catholic Church.

Surface and Drainage. Two ranges of the Andes Mountains traverse the country from northwest to southeast and divide it into three physical regions. The first is the coast region, with an average breadth of 20 miles, which is mostly a desert. The second is the interior plateau and mountain region, generally known as the Sierra, consisting of a broad plateau, upon which the ranges and spurs of mountains rest. These are interspersed by high valleys and deep ravines.

The loftiest summits are in the south, and many of them rise above the snow line, several attaining an elevation of 20,000 feet or more. While much of this region is cold and barren, in the main it is the home of the greater part of the population of the country. To the east of the mountains is the third region, known as the Montaña, a tropical region, well watered and densely wooded. This slopes from the foothills of the Andes to the low plains of Brazil and is by far the most fertile portion of the country.

The rivers of the coast region are short, rapid, unimportant and unsuited to navigation, but their water is used in irrigating the land adjoining their banks, and each river valley is clothed with abundant vegetation. The other streams rising in the valleys between the Andes or on the eastern slope take a northward direction and unite directly with the Amazon or with some of its tributaries. In the northern part of the country are the head waters of the Amazon, which is known as the Marañón until it is joined by the Ucayali, the great river of eastern Peru. Lake Titicaca, in the extreme southeast, lies partly in Peru and partly in Bolivia.

Climate. Along the coast the climate is hot, dry and somewhat unhealthy, but in the uplands of the interior it is mild and salubrious, the temperature at Lima in summer ranging from 80° to 84° and in winter from 60° to 64°, while on the eastern slope the temperature ranges from temperate to tropical, and the rainfall is heavy. The highest altitudes have a cold climate. The peculiarity of the rainfall is due to the fact that Peru lies in the path of the trade winds, which bring an abundance of moisture from the Atlantic. The eastern slope of the mountains robs the winds of most of this moisture, however, some reaches the intervening valleys, while the western slope has scarcely any, the annual precipitation there being less than five inches.

Minerals and Mining. Minerals constitute the chief source of Peru's wealth; and the value of the mineral output is about \$40,000,000 a year. Copper is the most valuable, followed by silver, crude petroleum, coal, gold and lead. Cerro de Pasco is the most important mining region. Copper is found along the coast, and there are large deposits of lead, bismuth, tin and silver. Coal is found in the central part of the country, and

a million barrels of petroleum are produced annually by the oil fields near Lake Titicaca. Vanadium was discovered in 1904, and Peru now supplies nearly three-fourths of the world's output of that metal. Guano is exported in large quantities, and the export of sulphur is annually increasing. Owing to lack of transportation facilities the mining industries have not been extensively developed.

Agriculture. In the valleys and uplands the soil is highly fertile, and wherever sufficient moisture can be obtained abundant crops are raised. In the lowlands the chief crops are sugar cane, cotton and rice, the first being considered the staple and affording the most valuable agricultural product for export. In the higher lands grains common to the temperate regions are raised. Fruits also are cultivated, and the manufacture of wine is becoming an important industry. The eastern part of the country is covered with dense forests, and its most important exports are forest products, consisting of rubber, cinchona, dye stuffs, medicinal drugs and, in the cultivated portions, cocoa, which is raised in quantities. Alpaca, sheep and llama wool are exported.

Manufactures. The manufacturing industries are few and of little importance. There are a few cotton factories in the larger towns, some clothing, furniture, boots and shoes, soap, lard, olive oil and cottonseed oil cake are manufactured. The Indians are noted for their skill in the manufacture of straw hats, which are sold as Panama hats, though they are made of a different fiber from the Panama hats of Ecuador.

Transportation and Communication. In 1919 there were about 1,800 miles of railway in operation and over 3,000 miles under construction or being surveyed. The lines in operation connect the principal cities of the country with each other. The line extending from Callao to Lima and thence to Oroya crosses the Andes at an elevation of 15,845 feet, and forms a part of the great trans-Andean railway system.

Peru has about 340 telegraph stations and 10,500 miles of lines. There is also a wireless system which gives Lima communication with the leading South American countries and some of the islands in the Pacific. There are about 800 postoffices, but off the lines of railway transportation of the mails is slow, owing to lack of good roads.

Commerce. The most important agricultural exports are sugar and cotton, Copper, silver and petroleum form the most important mineral exports. Minor exports include rubber, cinchona, alpaca, wool and panama hats. The imports consist of manufactured goods, machinery and such other products as the country cannot produce. The leading countries with which the commerce of Peru is carried on are the United States, Great Britain and (before the World War) Germany. Since the war commerce with the United States has increased rapidly. The monetary unit of Peru is the libra, equal in value to the English pound and in United States money to \$4.866.

Government. The country is a republic, and its present constitution quite closely resembles that of the United States. The executive power is vested in a President, who, with two Vice-Presidents, is elected by popular vote for five years. The President is ineligible for the next succeeding term. The President is assisted by a Cabinet of nine members. The legislative power is vested in a Senate of thirty-five members and a Chamber of Deputies of 110 members, elected by popular suffrage and apportioned among the political divisions according to population.

Education. Free public schools are maintained by the municipalities, and theoretically attendance is compulsory, though the law is not strictly enforced. High schools are maintained by the government in the capitals of the various departments, and the University of San Marcos has departments of law, literature, theology, medicine and political science. There are also small universities at Arequipa, Cuzco and Trujillo, and a school of mines and engineering is located at Lima.

Cities. The chief cities are Lima, the capital, Callao and Cuzco.

History. Peru was the center of a vast empire ruled by the Incas, who, previous to their conquest by the Spaniards, extended their sway over a large part of what is now Chile, Bolivia, Ecuador, Brazil and northern Argentina. Owing to internal dissensions the Incas were easily conquered by the Spaniards early in the sixteenth century, and Peru became a Spanish colony. The early Spaniards abused the natives in a most cruel manner, until the sufferings of these unfortunate people caused the home government to take action in their behalf, when a more humane policy was instituted. During the

sixteenth and seventeenth centuries, the colony of Peru, together with other South American colonies, was torn by dissensions between contending rulers and factions. In 1718 the Province of Quito was separated from Peru, and sixty years later a large portion of the southern territory was added to the government of Buenos Aires.

In 1816 Peru attempted to gain its independence, but was not successful. However, with the assistance of English volunteers and troops from Chile and other South American countries, it succeeded in 1821. From that time to 1883 the country was frequently involved in war with adjoining states or was torn by civil dissension. The last wars with Chile and Bolivia were particularly disastrous, since Peru was enabled to make peace only by ceding considerable territory. Boundary disputes with Colombia were peaceably settled in 1928. In 1927 efforts to arbitrate the dispute with Chile over the Arica-Tacna district were made by neighboring countries. A Commission from the United States recommended a plebiscite. Finally in 1929 by diplomatic means the dispute was settled, Arica going to Chile and Tacna to Peru. Population, about 6,150,000.

Related Articles. Consult the following titles for additional information:

Andes	Inca
Callao	Lima
Cuzco	Pizarro, Francisco
Guano	Titicaca, Lake

PERU', ILL., in La Salle County, sixty miles northeast of Peoria, at the head of navigation on the Illinois River, which is crossed by four bridges, and on the Illinois & Michigan Canal and the Chicago, Burlington & Quincy, the Chicago, Ottawa & Peoria and the Chicago, Rock Island & Pacific railroads. It has a picturesque location and contains a public square and public parks. Saint Bede College (Roman Catholic) is located here, and other prominent buildings are a Carnegie Library, People's Hospital, Turner Hall and Masonic Temple. Peru is near deposits of bituminous coal, white sand rock and cement rock, and it has a foundry, a machine shop, a planing mill and manufactures of scales, clocks, implements and various other articles. In the vicinity are interesting relics of the Mound Builders. The place was settled in 1827 and was chartered as a city in 1852. Population, 1920, 8,869, in 1930, 9,121.

PERU, IND., the county seat of Miami County, seventy-five miles north of Indian-

apolis, on the Wabash River and on the Nickel Plate, the Wabash and the Chesapeake & Ohio railroads. There is an airport. The city contains railroad shops, electric, carbon and steel works, candy factories, woolen mills, manufactories of kitchen and radio cabinets, and castings. Peru has a public library, Maconaquia Park, two sanitoriums and the Wabash Railroad Hospital. The city is the winter quarters of three circuses. Population, 1920, 12,561, in 1930, 12,730.

PERUGINO, *pa ru jé'no*, (1446-1523), so called because he was born near Perugia, Italy, was one of the foremost painters of the early Italian Renaissance. His real name was PIETRO VANNUCCI. Taught by some of the greatest painters of this time, he in turn, rose to mastery of his craft and became the teacher of Raphael, one of the greatest of Italian artists. The rich, warm color of Perugino's canvases, the sweetness and gentleness of his faces are reflected in the work of his illustrious pupil. Perugino was one of the first Italian painters to use oil colors. He received so many commissions a large amount of the work of his studio was executed by assistants. He executed an important series of frescoes for the Sistine Chapel, Rome, some of which still remain. Fine specimens of his frescoes are also preserved at Perugia, Bologna and Florence.

PERUVIAN BARK, the bark of various species of trees belonging to the cinchona family. It is valued for the quinine it contains. The trees are native to South America, particularly Peru. See QUININE.

PESETA, *pa say'tah*, the standard money unit in Spain, having the same intrinsic value as the French *franc* and the Italian *lira*. It is worth about 135 cents in United States and Canada money. The peseta is silver; it has on one side the head of the king, and on the other the Spanish coat of arms. Two-peseta silver pieces are made, and five, ten, twenty and twenty-five peseta pieces are coined in gold. "Peseta" means *little peso*. See PESO.

PESO, *pay'so*, the name given the monetary unit in Mexico, in Central America and in most South American countries. The value of the peso varies with location. The peso of Mexico is equivalent to \$0.28 of United States and Canada money, that of Central America to \$0.21, while in Uruguay it is of practically fifty cents in value. The peso originated in Spain, where formerly coins

of this name were made in gold and in silver, the former called *peso de oro*, and the latter *peso de plata*. To-day the monetary unit of Spain is the *peseta* (which see).

PESSIMISM, *pes'is'm*, a dark view of life held by those who believe there is more evil than good in the world. The advocates of this doctrine find justification for it in what they consider the unmerited and unreasonable suffering that forms so large a part of common experience. Though ordinarily regarded as merely the product of morbidness, pessimism, in its best expression, is a craving for perfection, for a brighter and more joyous life than the one we know, and its gloom is proportional to the extent life fails to measure up to the ideal. The pessimistic view of life is developed and systematized in the philosophy of Schopenhauer.

PESTALOZZI, JOHN HEINRICH (1746-1827), one of the most celebrated educational reformers of the nineteenth century, was born at Zurich, Switzerland, and educated in the Zurich Latin School and the public university. Early in life he became acquainted with the wretchedness of the lower classes, and after failing in several occupations, he decided to devote his life to the work of a teacher. He opened his house at Nuhnof to the children of the poor, and in addition to the instruction of the home, he used his farm as a means of giving them industrial training. However, his efforts were not appreciated, and his enterprise failed for want of proper support. But his experience had made him so thoroughly acquainted with the conditions of society that he resolved to continue the work. About this time he published *Leonard and Gertrude*, a work in which he set forth his ideas of education.



JOHANN HEINRICH
PESTALOZZI

In 1798 he opened a school at Stanz for orphan children who had been deprived of their homes through the French invasion of Switzerland. Within a few months, however, the military situation compelled him to abandon the school, and he removed to Bergdorf where he opened a tuition school, which

was later removed to Yverdon. It was in this school that Pestalozzi established his reputation as an educational reformer. Here he gathered about him pupils from nearly every country of Europe and from the United States. Such was the reputation of his school that it was visited by the rulers and leading educators of the world. However, he was not a good administrator, and within a few years dissensions arose among the faculty, which caused the school to lose its influence, and finally Pestalozzi was obliged to give it up. He died in comparative poverty.

Pestalozzi's Influence The value of Pestalozzi's work as an educator consists largely in the principles which he set forth and attempted to put into practice. He believed that the principles of education were to be found in human nature, and that this nature consisted of physical, intellectual and moral capabilities, all of which should be trained. He also believed that it was the duty of the teacher to remove obstructions from the way of his pupils and to stimulate them in the exercise of all their powers. He was a strong advocate of education through observation, or the cultivation of the senses, and believed that all knowledge began in this way, and that the child should acquire his ideas through his own activity, under the direction of the teacher. He was a strong advocate of industrial education and believed that it should go hand in hand with intellectual and moral training. The soundness of his principles is shown from the fact that they now form the foundation of the system of instruction in the normal and public schools of America and the leading countries of Europe. Consult De Guimps' *Pestalozzi, His Life and Work*.

PETAIN, HENRI PHILIPPE (1856-1924), a great French military leader, the hero of the defense of Verdun, and one of three generals who were awarded the title of marshal of France for services rendered during the World War. The others were Joffre and Foch. Pétain was born near Calais, and was educated at the military school at Saint Cyr. In August, 1914, at the outbreak of the World War, he was a colonel, but was at once placed in charge of a brigade, and by September had been made general of a division, because of the valiant conduct of his brigade in the retreat from Charleroi to the Marne. In the spring of 1915 he led the 23rd army corps in the Battle of Champagne, and in

February, 1916, took charge of the defense of Verdun. His splendid service during the critical weeks of the German drive made him a national hero, and everyone rejoiced when he was made commander in chief of the French armies on the Western front, in May, 1917. A year later all the allied armies were placed under the supreme command of General Foch, a step which resulted in victory for the entente. In November, 1918 General Pétain entered Metz at the head of his victorious troops, and in that city, in the following month, he received from President Poincaré the baton of a marshal of France.

PETER, or **SIMON PETER**, one of the leaders of the Twelve Apostles. Little is known of his early life. Previous to his call by Jesus, he and his brother Andrew were fishermen on the Sea of Galilee. Both were attracted by the preaching of John the Baptist, and they followed him. Later when called by Jesus, they gave up their calling and devoted the remainder of their lives to the propagation of the Gospel. During Jesus's brief career upon earth, Peter was one of his most devoted followers, and after the ascension he was recognized as the leading spirit in the movement to spread Christianity. A comparatively full account of his activities is found in the *Acts of the Apostles*. He was the author of two books of the New Testament, the *First Epistle General of Peter* and the *Second Epistle General of Peter*. It is said he was put to death by crucifixion at about the same time that Saint Paul was executed.

PETER I, ALEXEYEVITCH (1672-1725), a czar of Russia, known in history as **PETER THE GREAT**. He was neglected in his childhood and youth, and he picked up his education in the streets. As a youth he had insatiable curiosity, keen intelligence, precocity and strong will. On the death of his brother Feodor, Peter was declared czar, but his ambitious half-sister Sophia was actual ruler. When he was seventeen he wrested the power from her and shut her up in a convent. In 1697 he visited Holland and England and in those countries worked for two years at manual trades, chiefly shipbuilding. Returning to Russia, he wrought a transformation in national ideals. He created a navy, founded schools, imported foreign artisans, established manufactories of arms, tools and fabrics and improved the roads and canals throughout the country. He reformed dress,

improved the status of women and purified the civil administration, making merit the sole requisite for appointment to office. His reforms offended the conservatives, and insurrections arose, in which his wife and son, Alexis, heir to the throne, were implicated. He condemned Alexis to death and his wife to life imprisonment.

The chief objective in Peter's foreign policy was to secure an outlet to the ocean through ice-free ports, and in pursuance of this he wrested the Baltic provinces from Charles XII of Sweden, built Saint Petersburg—now Leningrad—which was to be a naval base commanding the Baltic waters, and constructed the harbor of Kronstadt. He made war on the Turks and established a foothold on the Black Sea. The aim of the later czars, either to neutralize or possess Constantinople, was a logical sequence of this policy. In 1712 Peter married his mistress Catherine, who was crowned in 1724 and succeeded him as Catherine I.

PETER I, KARAGEORGEVITCH (1846-1921), the World War king of Serbia. He was born at Belgrade and educated in Hungary and at the French military academy of Saint-Cyr. He fought as an officer in the French army during the Franco-German War and, returning to the Balkans, encouraged the revolt which led to the Russo-Turkish War of 1877 and ultimately to the establishment of Serbian independence. In 1883 he married Princess Zorka, daughter of Prince Nicholas of Montenegro. When, in 1903, King Alexander and Queen Draga of Serbia were murdered, Peter was elected king. He was firm in opposition to the Austro-Hungarian policy with respect to Serbia, and when the difficulties between the two countries culminated in the World War in 1914, he took the field with his army. In 1915, when the forces of the central powers occupied Serbia, Peter and his court removed to Greece. After the surrender of the German allies and the restoration of Serbia, in the fall of 1918, the aged king remained in retirement near Athens, leaving the actual administration of af-



PETER THE GREAT

fairs to his Cabinet and the heir apparent, Prince Alexander. The latter was chosen regent of the new Jugo-Slavic state in 1918. See JUGO-SLAVIA, SERBIA.

PETERBOROUGH, ONT., the capital of Peterborough County, on the Otonabee River, the Canadian National and the Canadian Pacific railways, and the Trent Canal. It is about seventy-five miles northeast of Toronto. It is a well-built city, in the midst of a beautiful lake country, is the seat of a Catholic bishop and has a provincial normal school. The lock on the canal here is one of the largest hydraulic locks in the world, with a lift of sixty-five feet. Here is the plant of a large electric manufacturing company. There are also manufactories of cereals, furniture, pulp mill and dairy machinery, agricultural implements, wooden ware, iron castings, canoes and outboard motors, watches and clocks, and textiles, and there are pork-packing establishments. Population, 1931, 22,327.

PETERSBURG, VA., at the junction of Chesterfield, Dinwiddie and Prince George counties, is twenty miles south of Richmond, on the Appomattox River, crossed by two steel bridges, on the Upper Appomattox Canal and on the Norfolk and Western, the Atlantic Coast Line and the Seaboard Air Line railroads. The place was settled in 1733 on the site of an Indian village destroyed in the seventeenth century. It was incorporated as a town in 1748 and as a city in 1850. Because of its being an important railroad center, it was the scene of constant fighting during the last year of the Civil War in America (see **PETERSBURG, SIEGE OF**). Fourteen battles were fought in and around the city.

The city is in an agricultural region in which tobacco is the chief product. It is also a center for peanut shipments. There is good water power, and the manufactures include tobacco, cotton, silk, knit goods and other articles. The city has the Southern Female College, the State College for colored students, Bishop Payne Divinity School, and the State Central Hospital for colored. Other important structures are the Y M C A building, the Home for the Sick, the Benevolent Mechanics' Association building, with its library and museum, and the Masons', Odd Fellows' and Red Men's buildings. Population, 1920, 31,002, in 1930, 28,564, in 1932, by annexation, 30,076.

PETERSBURG, SIEGE OF, a famous siege of the Confederate position at Petersburg, between June, 1864, and April, 1865. The Federal army was commanded by Grant, who, after his famous Virginia campaign, took up his position before Petersburg, with the intention of capturing this point and thus compelling Lee to evacuate Richmond, Va., the capital of the Confederacy, twenty miles distant. An assault made on the fifteenth of June by General Butler failed, and other assaults on the three following days were equally unsuccessful. On July 30 occurred the fiasco of the famous Petersburg mine. General Burnside ran a mine under the Confederate fort for the purpose of opening a gap through which to make a charge. Inefficient leadership caused the Federals to be trapped, and 4,000 were killed. On April 2, 1865, a continuous bombardment of more than a week compelled the Confederates to evacuate, and the following day Lee retreated from Richmond. Six days later Grant and Lee met at Appomattox Court House and arranged terms of surrender, the act which ended the war.

PETER THE HERMIT (about 1050-1115), an enthusiastic monk of Amiens, whose preaching started the First Crusade. He went through France on a mule, clad in a hermit's robe and carrying a crucifix, preaching the duty of Christians to free Jerusalem from Mohammedan rule. More than 30,000 responded to his call. He led this undisciplined band across Southern Europe, but few reached Palestine, for nearly all perished of starvation and disease. Peter, with his followers, joined the army of Godfrey de Bouillon, and he distinguished himself at the storming of the Holy City. On his return to his native country he founded the abbey of Neufmouster and died there.

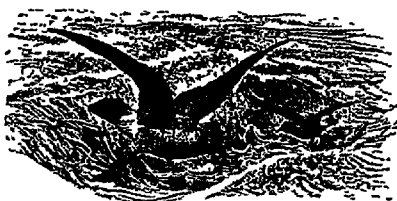
PETITION, *peti'shun*, a formal written request made to a legislative body, a court or an officer in authority to grant it, for reform in government, the enactment or repeal of certain laws, the pardon of one convicted of crime, etc. The right of petition is one of the fundamental conditions of a free government, and it is guaranteed the people of the United States by the Constitution. The first amendment provides that Congress shall make no law "abridging the right of the people peaceably to assemble, and to petition the government for redress of grievances."

PETITION OF RIGHT. When Charles I assembled Parliament in 1628, one of the first actions of the House of Commons was to draw up a statute detailing the grievances they had against the king, and this statute, from the form in which it was presented, was known as the Petition of Right. It made no pretense of being a new law, but simply rehearsed the old statutes, which Charles had violated, and demanded that the ancient rights be confirmed. Besides the most important provision, that freemen should not be arrested without due legal process, it cited those statutes which forbade the levying of taxes or loans without the consent of Parliament, the quartering of soldiers upon private citizens and the proclamation of martial law in time of peace. Charles attempted to return an equivocal answer to this document, but was obliged to assent to it when Parliament began proceedings against the duke of Buckingham.

PETRARCH, *pet'rah'rk*, FRANCESCO (1304-1374), an Italian poet and scholar who has written some of the noblest lyrics in all literature and who exercised an inestimable influence over the poets of Europe. He was born at Arezzo. At Avignon, in 1327, he first saw in the Church of Saint Claire the Laura who exercised so great an influence on his life. After this meeting Petrarch remained at Avignon three years, singing his purely Platonic love and haunting Laura at church and in her walks. Later he visited leading cities of France, Italy and Germany. Upon his return, he bought a small estate at Vaucluse, near Avignon, that he might be near Laura. At intervals during the rest of his life, he traveled again through Italy, and many honors were bestowed upon him. In 1341 he was called to Rome to receive the laureate crown awarded for his Latin poem, *Africa*, an epic on the Punic wars. At Parma Petrarch learned of the death of Laura, which he celebrated in his *Triumphs*. After 1360, he spent his remaining years in literary pursuits, at Arquà, near Padua. Although Petrarch based his hopes of fame upon his scholarly Latin works, these are now practically forgotten, while his Italian verse, of which he thought comparatively little, has exalted him for all time.

PETREL, an interesting sea bird about the size of a large duck. It has somber plumage, long legs, webbed feet and a broad, flat tail, and is a strong, swift flyer, sailing

about with little visible movement of its wings and often gliding along close to the waves with a rapid, graceful movement, apparently running on the surface of the water.



MOTHER CAREY'S CHICKENS

Flocks of these birds will follow a ship many miles from shore for the refuse in its wake. When exhausted the bird settles down upon the water like a duck to rest, tucking its head under a wing. Petrels breed in colonies, on rocky, desolate coasts. Only one egg is laid at a time, in a crevice of rock or in a burrow which the bird makes in the ground.

Petrels are at home in both the northern and southern hemispheres. Of the several species the best known are *Wilson's petrel*, a large Antarctic bird; *Leach's petrel*, a native of the northwestern shores of North America, and the *stormy petrels*, also called *Mother Carey's chickens*. This last bird, which lives far out over the Atlantic and is rarely seen near shore, is regarded by sailors as a sign of foul weather. It is only five inches long, the smallest of all web-footed birds.



PETROGRAD, Russia's second city in size. From 1703 until 1918 it was historic St. Petersburg, then until 1924, Petrograd, in the latter year it became Leningrad (City of Lenin). Before 1918 it was the capital city. In March, 1917, the czar was overthrown and a democratic régime succeeded to power. Petrograd remained the capital for about a year. In 1917 the moderate Socialist government headed by Kerensky was supplanted by the radical government of Lenin and Trotzky, and in the following March they made Moscow their capital. What is now Leningrad is on the Neva River where

it enters the Gulf of Finland, and is 400 miles northwest of Moscow. The city is built upon low land which is subject to overflow, and much of this is protected by walls and by the construction of canals, which receive the surplus water. Before entering the gulf, the Neva divides into several arms, forming a delta, most of which is within the city limits. The main branch, known as the Great Neva, divides the city into two chief divisions, the right side, which was the nucleus of the city in the time of Peter the Great, and the left or "great" side, on the mainland to the south, which became the center of business, fashion and government. These sections and the numerous islands occupied by the city are connected by over 120 bridges, some of which are supported on pontoons, so that they can be removed during the winter.

The left side, or "great city," is divided into four quarters, the most important of which is the admiralty quarter, on the south bank of the river and in the center of the city. This quarter is so named from the admiralty building, a structure about 1,600 feet long, which contains the admiralty offices and a museum. From this square the four principal streets of the city radiate. Of these the Nevski Prospekt, 130 feet wide and about four miles long is the finest. On the



southeast of the admiralty building are the Alexander Gardens, and on the southwest is Peter Square, containing a colossal equestrian statue of Peter the Great, beyond this square are the buildings of the senate and the Holy Synod. To the southwest of the admiralty is the Cathedral of Saint Isaac, the most celebrated cathedral of the city. It is built in the form of a Greek cross and is surmounted by a large gilded dome. The porticoes are single pillars of polished granite, over fifty feet high. To the northeast of the admiralty extend the palaces, the most famous of which is the Winter Palace of the

former czars. It was the center of bitter struggles during the revolution which overthrew Kerensky. Adjoining the Winter Palace is the Hermitage, which formerly contained one of the finest art galleries in Europe. In Palace Square, to the southeast of the Winter Palace, is the Alexander Column, a monument nearly 100 feet high, erected to Alexander I.

One of the islands is occupied by the old Fortress of Saints Peter and Paul, which was the original nucleus of the capital and later used as a city prison. Within this enclosure is also the Cathedral of Saints Peter and Paul, in which it was once the custom to bury the czars and other members of the royal families. Another island is occupied by the University of Leningrad and other prominent educational institutions, while a third is the site of a fine botanical garden.

Leningrad was formerly the literary and intellectual center of Russia and it supported a number of higher institutions of learning, including the university named above, the Academy of Sciences, with a library of over 500,000 volumes, the Institute of Technology, an industrial school, the Conservatory of Music, founded by Rubinstein, and numerous schools for the higher education of women, as well as technical schools in medicine and the various branches of natural science. The Soviet State (formerly Imperial) Library contains over 1,300,000 volumes and nearly 40,000 manuscripts.

Leningrad was also the great commercial and industrial center, and notwithstanding the fact that its port is closed by ice during several months of the year, its exports and imports were extensive. The industrial portion of the city is located on the right or Leningrad side, where are found most of the large factories and the residences of the workmen. The leading industries were the manufacture of textiles, india rubber goods, tobacco products, leather, machinery and various stone products. The city was the western terminus of the Trans-Siberian and other important trunk lines of railroad.

The fort erected by the Swedes at the mouth of the Neva was captured by Peter the Great in 1703, and he immediately decided to make this the site of the capital of the empire. By 1712 he was enabled to remove the government to the new capital, and from that time the city increased in population and importance, until it became one of

the most distinguished capitals of Europe. The name St Petersburg was abandoned during the World War, for it was a German form. The same designation, "Peter's City," survived in the new Petrograd. To wipe out a reminder of the czarist régime, the Soviet rulers made it the "City of Lenin."

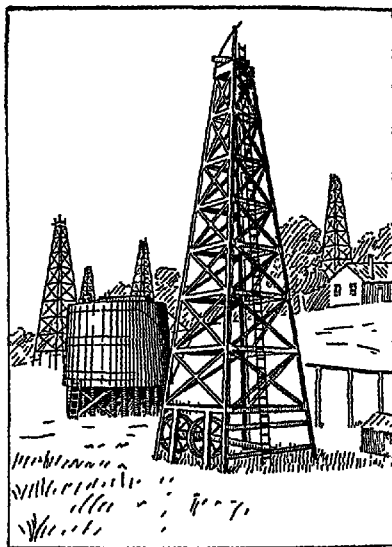
Under the régime of the Bolsheviks it rapidly declined in population, and its prosperity entirely departed. By March, 1919, the number of inhabitants had decreased to 800,000. Commerce and trade had practically ceased, and all necessities of life were sold through communal stores controlled by the government. Few trains entered or left the city. The Soviet authorities were too busily engaged in providing Moscow with facilities demanded by its phenomenal increase in population to alleviate at once the distress in the former capital city. But a better day was to dawn. A census in 1926 reported a population of over 1,600,000, in 1933 it had outdistanced all preceding years, and then had 2,776,400 people. See RUSSIA.

PETROLEUM, a mineral oil occurring in rock or sand in various parts of the world, but produced most extensively in Russia and the United States.

Oil Wells. In some localities where petroleum is abundant, it reaches the surface in small quantities, but for commercial purposes it is obtained by boring wells into the sand or rock where it is stored (see WELL BORING). Occasionally the oil is confined under great pressure, and when the reservoir is opened it flows with a steady stream which may rise many feet into the air. Such a well is known as a *gusher*. From most wells, however, the oil must be pumped. When the flow has diminished so that further pumping is unprofitable, it may be restored by "torpedoing," that is, by exploding a charge of dynamite at the bottom of the well. This removes any obstruction, such as an accumulation of paraffin, and also loosens the oil-bearing sand, and the flow is resumed. Oil wells vary in depth from 300 to 5,500 feet. Usually the largest flow comes from the deep wells.

Refining. As it comes from the wells, petroleum is a dark-colored, oily liquid, varying in shades from brown to black, and in thickness from the consistency of kerosene to that of warm tar, or molasses. Before petroleum can be used for many purposes it has to be purified, or *refined*. Crude petro-

leum contains a number of valuable substances, which are easily separated from each other by distillation. The oil is placed in large iron tanks containing about 600 barrels each and is heated slowly. The most volatile



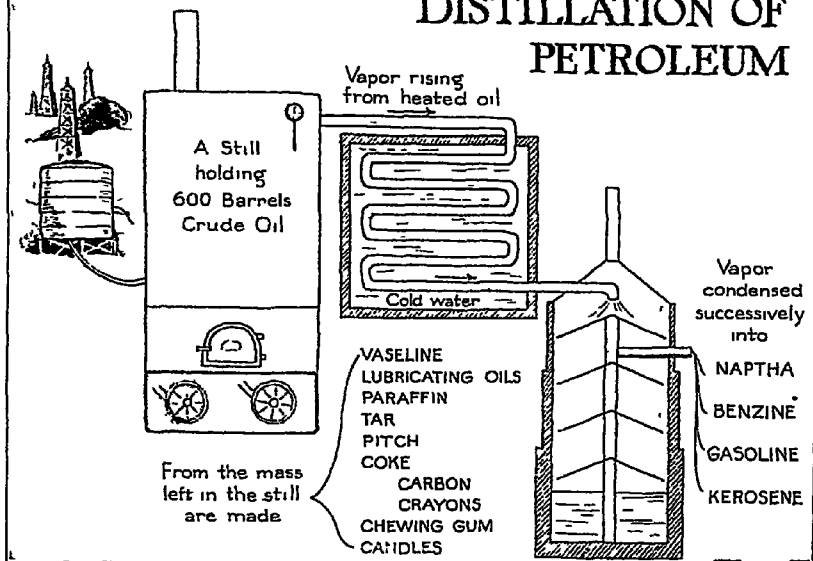
OIL WELLS AND TANKS

substances—naphtha and benzine—are separated at a low temperature. Then, as the temperature is raised, follow gasoline and kerosene. From the contents of the tank still remaining are obtained various lubricating oils, paraffin wax, and vaseline, leaving as a residue a porous mass of separated carbon. There are over 200 commercial products obtained from the refining of petroleum.

The products obtained by the first distillation are further purified by means of redistillation with a small quantity of sulphuric acid. Of these gasoline and kerosene are the most important.

Transportation. The oil and its refined products are transported in various ways. For the transportation of crude oil, pipe lines (which see) lead from the oil regions to the large refineries, the oil being pumped as far as from Texas and Wyoming to New Jersey. For the distribution of petroleum, tank steamers are constructed for water transportation, and tank cars, for transportation by railways. These cars are familiar sights on all lines of railway, and the oil company usually establishes in every large town a de-

DISTILLATION OF PETROLEUM



In the short period of sixty years since the first oil well was struck, the production of petroleum in North America has reached an annual total of over 11,801,000,000 gallons. With the constantly increasing use of oil, science has made the refining of oil a marvel of efficiency. The residue from distillation which was once thrown out as waste, is now transformed into more than two hundred products of great commercial value. There is now no waste.

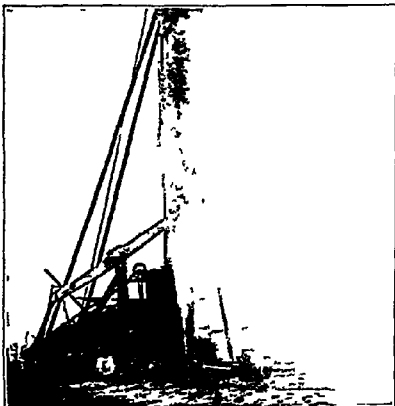
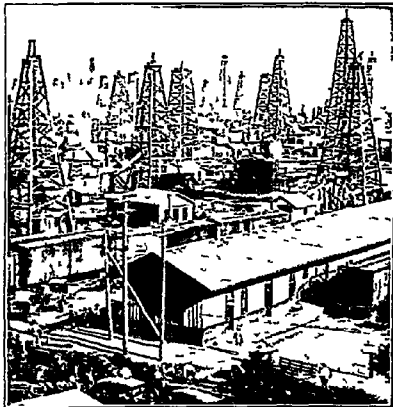


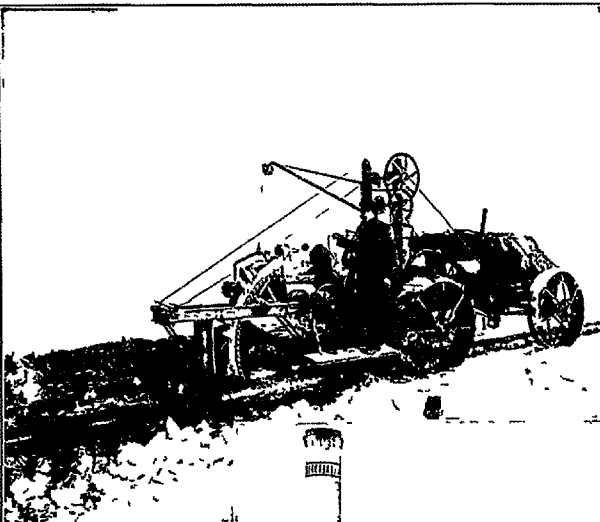
Photo from Underwood and Underwood

"Way Down Yonder in the Cornfield" up to date. A Southern farmer has "struck oil," and will make more money in a few days than he has made from corn and tobacco in many years. This well is a "gusher," and much oil will be wasted before the flow is brought under control.



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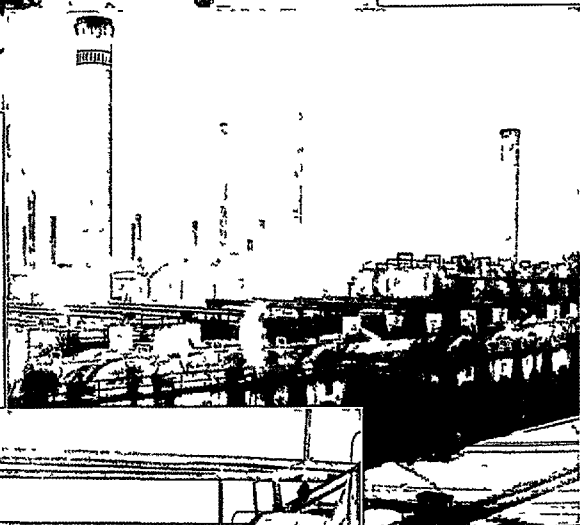
One of the richest of the newer fields. Scenes like this come into existence almost overnight. The rush into a new oil field is as feverish as the '49 gold stampede into California, and the sudden fortunes many times greater.



Laying an eight-hundred-mile pipe line from Oklahoma to Chicago for the Sinclair Refining Company. It is much cheaper to transport crude oil this way than by tank car. Along the pipe-lines at intervals of forty miles are pumping stations to keep the stream of oil moving. The 25,000 miles of pipe-lines used for Pennsylvania oil alone would make an iron belt around the earth's waist.

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Front view of an oil refinery. Stills for "fractional distillation!" Crude oil consists of a large number of substances, many of which vaporize, and at different temperatures. These vapors pass off, in turn, leaving a mass from which are made wax, tar, pitch, and coke.



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Rear view of the same stills. The pipes overhead carry the vapors from the stills to the condensing coils at the left. These coils are surrounded by cold water, which causes condensation. The resulting fluids are collected separately and further purified. More than two hundred by-products come from the refining of petroleum, covering a wide range from chewing gum and asphalt to medicinal preparations.

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pository, which consists of groups of great metallic tanks, to contain the oil of different grades. As the cars arrive their contents are emptied into these tanks, from which the oil is distributed to the local dealers.

Uses. The use of crude petroleum as fuel began near the large centers of production—Texas, New Mexico, Arizona, and Southern California. When facilities for cheaper transportation were developed notably pipe lines and tank steamers, petroleum displaced coal to an extent that is amazing. Today any family in modest financial circumstances almost anywhere in the United States may heat its home with oil at a cost that is not burdensome. Practically all new ocean steamships use petroleum as fuel, and modern naval vessels utilize it instead of coal. The British navy buys a large part of the oil produced in Mexico. It has been found inexpensive to oil roads with petroleum. When a thin coating of oil is spread over a road made of sand and soil, it gradually cements the particles, dries, and makes a hard, durable roadbed.

Of the refined products, gasoline is of first importance, because of the universality of its use in internal-combustion engines. Automobiles, airplanes, and tractors, principally, provide a market in the United States alone for about 16 thousand million gallons of gasoline every year.

Production. The United States and Russia together produce one-half (usually more) of the world's petroleum. Russia's proportion is about one-sixth that of the American republic. World production is close to 1,600,000,000 barrels each year, any change from this total is likely to range upward. The United States' output is about 800 million barrels, Russia's, 155 million. Following the two leading producers, Venezuela is third (116 million), Rumania fourth (54 million), and Persia fifth (49 million).

The output in ten leading American states, in barrels of 42 gallons, is as follows, the figures show maximum and minimum production over a three-year period.

Texas	310,000,000 to 395,948,000
Oklahoma	153,244,000 to 181,188,000
California	172,277,000 to 178,128,000
Kansas	34,848,000 to 41,841,000
Louisiana	21,807,000 to 24,720,000
New Mexico	12,511,000 to 14,101,000
Pennsylvania	12,403,000 to 12,678,000
Wyoming	11,205,000 to 12,845,000
Arkansas	11,669,000 to 12,051,000
Michigan	6,910,000 to 10,708,000

Nine other states are credited with small production, ranging from 1,000,000 to 6,000,000 barrels. The output of the different fields, far from uniform, changes the position of the states from year to year, but Texas, Oklahoma, and California have long enjoyed supremacy. In general, the production of the older fields falls off, and that of new fields increases for the first few years after the field is opened.

History. In the United States petroleum was first found in Pennsylvania. It was not called by that name, and was a nuisance. Men digging wells encountered it, much to their disgust, it rendered the water useless. Wherever found, it was drained into streams. Once an oily river was set afloat to destroy the oil upon it but that dangerous expedient was not attempted again. The American petroleum industry dates from 1859, when E. L. Drake of Titusville, Pa., sank a well that produced 25 barrels a day. Colonel Drake's purpose in sinking the well was to obtain a supply of oil which he could put upon the market under the name of *Seneca oil*, as a remedy for rheumatism. Other wells immediately followed Drake's and within two years the industry was firmly established in and about Oil City and Titusville. From that time the petroleum industry has continued to grow, until it has reached its present proportions. See BENZENE, GASOLINE; KEROSENE.

PETUNIA, a flowering plant belonging to the nightshade family. The beautiful, fragrant blossoms range in tint from deep purple to violet, rose, pink and white. Many varieties are variegated. The leaves and stems of the plants are covered with a fine white fur. Petunias are natives of South America and Mexico, but are widely cultivated in all North American gardens.

PEWEE. See PHOEBE.

PEWTER, *pu'ter*, an alloy of tin and lead, or of tin with proportions of lead, zinc, bismuth, antimony or copper, used for domestic utensils. It is a soft metal, similar in appearance to tin, but duller and darker. It was formerly used extensively in the making of plates and other domestic utensils, but because of the poisonous properties of the lead, measures prohibiting its use have been enacted in many countries, and other alloys largely have been substituted. Pewter dishes of olden times are highly prized by collectors.

PHAEDRA, *fé'dra*, in Greek mythology, daughter of Minos, king of Crete, and sister of Ariadne. She was sought in marriage by Theseus and was brought to Athens. There, however, she fell in love, not with Theseus, but with his son Hippolytus. As he refused to comply with her request and elope with her, she accused him to his father of having tried to kidnap her, and in response to the prayers of Theseus, Hippolytus was killed by Neptune. When his drowned body was thrown at the feet of Phaedra, she became repentant, confessed her sin and killed herself.

PHAETHON, *fa'ethon*, in classical mythology, the son of Apollo and Clymene. Mocked by his friends because of his boasting that the sun god was his father, he visited Apollo and asked his recognition. Apollo gladly acknowledged Phaethon as his son, and in response to a request, promised to prove their relationship by granting to Phaethon anything he might ask. When he begged to be allowed to drive the chariot of the sun for one day, Apollo endeavored in vain to dissuade the boy from this folly. Reluctantly he entrusted Phaethon with his fiery steeds, giving him strict directions how to drive. But the horses immediately recognized that their master did not hold the reins, and they dashed wildly out of their course, coming at times so near to the earth that they almost set it on fire and turned black the races living in Africa; at other times they rose so far above the earth that everything was frozen. Jupiter, seeing this destruction and fearing further consequences, struck Phaethon with a thunderbolt and threw him into the River Po. See MYTHOLOGY.

PHALANX, *fa'lanks*, or *fal'anks*, a name commonly given by the Greeks to the whole of the heavy armed infantry of an army, but more specifically to each of the grand divisions of that class of troops, when formed in ranks and files close and deep, with their shields joined and their pikes crossing each other. The Spartan phalanx was commonly eight files deep, while the Theban phalanx was much deeper.

PHANEROGAMOUS, *fan ur og' a nus*, **PLANTS**, or **PHANEROGAMS**, *fan'ur o gams*, the general name for that great class of plants which bear flowers. Flowerless plants are known as *cryptogams*. The chief distinction between the two great classes of plants is that the phanerogams produce seeds

containing an embryo, while the cryptogams produce spores which are simple cells without an embryo. To the phanerogams belong nearly all of those plants which are conspicuous and most of those which are useful to man. See BOTANY.

PHARAOH, *fa'ro*, the title given in Biblical narrative to the kings of Egypt. The Pharaohs mentioned in the time of Abraham and Joseph were probably the Hyksos shepherd kings; the Pharaoh of the time of Moses was probably Rameses II. Pharaoh Necho is the first Pharaoh whose proper name is mentioned in the Bible.

PHARISEES, *fair'ees*, a religious sect, influential among the Jews at the time of Christ, which played a prominent part in the events recorded in the New Testament. At the time of Christ the Pharisees stood as the national party in politics and religion, the opponents of the Sadducees.

To the written law of the Pentateuch, the Pharisees added an oral law to complete and explain the written law, which covered the minutest details of daily living with such precision that it weighted the people with "burdens too grievous to be borne." In fact, the strict observance of small points often led to hypocrisy and self-glorification. Besides subscribing to the oral law, the Pharisees believed in the continuance of life after death of the body and the resurrection of the dead. The sect contained a body of pious, learned, patriotic men, and after the Christian Church had organized itself independent of Judaism, they segregated themselves more than ever from the world. The laws of the Talmud, recognized as authority by the Jews of all nations, were the work of the Pharisees. Saul and his teacher Gamahel were members of this sect.

PHARMACOPOEIA, *fah'r ma co pe'ya*, a book containing a list of all standard drugs (with a description of each, showing its standard strength and purity) and directions for their use. Such books are compiled by experts, most of them by government authorization. The first United States pharmacopoeia was published in 1820. It was prepared at a convention of delegates from medical colleges and societies. Since then similar conventions have been held every ten years to revise the work. The latest edition appeared in 1935. This book is a legal standard in the United States, and registered pharmacists make use of it in their practice.

PHARMACY, the art of preparing, compounding and dispensing medicine. Physicians were the first pharmacists, for originally they prepared their own medicines, but as practice grew broader and drugs were more generally used, a separate profession, that of the pharmacist, naturally arose. The laws of almost every state now rigidly exact a technical education and drug store experience before licensing pharmacists to practice. Many schools, some of them connected with the most prominent universities in the United States, give, in courses extending over two or four years, the training necessary, though in most states the license to practice must be obtained directly from a specially appointed board of pharmacy.

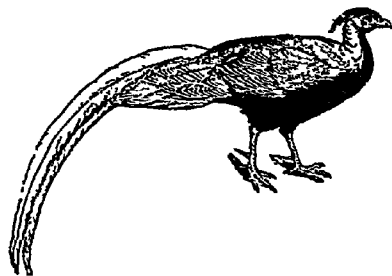
PHAROS, *fa'ros*, an island in the Mediterranean, off the coast of Egypt, now occupied by a part of the city of Alexandria. The island was long celebrated for a lighthouse erected on it by Ptolemy I and regarded as one of the Seven Wonders of the World. This lighthouse was built on a square base 100 feet wide and was perhaps several hundred feet high. It was destroyed by earthquake in the fourteenth century. The classic poets used metaphorically the expression "Pharos flame" much as modern poets say "beacon light."

PHARYNX, *far'inks*, the term applied to the muscular sac which lies between the cavity of the mouth and the narrow esophagus, with which it is continuous. It is funnel-shaped, about 4½ inches in length and communicates with the two nostrils, the two Eustachian tubes, the mouth, the larynx and the esophagus. It aids in swallowing and in producing the higher notes of the voice.

PHEASANT, *fe'zant*, a group of large birds related to the barnyard fowls, brilliantly-colored and usually long-tailed. Pheasants, like domestic fowls, are polygamous. They roost in trees and feed on berries, seeds, herbs and worms. The eggs are olive-brown. These birds, natives of Asia and Eastern Europe, have been naturalized in various parts of the world. In England pheasants are among the commonest of game birds, and thousands of them are raised annually on the great preserves and are driven before the guns in the hunting season. Among the several species that have been introduced to English coverts are the *black-barred* and the *ring-neck Chinese* pheasants, the latter distinguished by its white collar and grayish-

blue upper wing coverts, and the *green* pheasant and *copper* pheasant, both from Japan.

Some of the specimens of the Far East are very highly-colored. The *Chinese silver* pheasant, which ranges through Southern China, has white upper plumage finely pen-



SILVER PHEASANT

ciled with black, blue-black lower parts, and long, handsome, downward-curving tail coverts. The *peacock* pheasant, which ranges through Tibet and China, is so named because of the multitude of "eyes" on the plumage of the tail and upper parts. Among the showiest birds in the world is the *Argus* pheasant, which can spread a fanlike wing, exhibiting rows of delicately tinted iridescent circles that appear to revolve in sockets. A gorgeously-colored bird is *Lady Amherst's* pheasant, with breast of metallic green, upper plumage of scarlet, rump of golden yellow and chest of amber. About its neck is a ruff of orange tipped with dark blue.

PHELPS, *felps*, ELIZABETH STUART. See **WARD**, ELIZABETH STUART PHELPS.

PHENACETINE, *fe'na'se'tin*, a white crystalline coal-tar product sometimes used as a remedy for fever and headache. It is similar in effect to antipyrine, and, although less dangerous than that remedy, it should never be given without a physician's prescription.

PHENIC, *fe'nik*, **ACID**, or **PHENOL**. See **CARBOLIC ACID**.

PHI BETA KAPPA, *fi' ba'ta kap'pa*, the oldest of the Greek letter societies, founded in December, 1776, at William and Mary College, in Virginia. The letters constituting the name are the initials of the Greek words meaning "Philosophy, the guide of life," which is the motto of the society. The insignia is a gold key. Gradually the society has lost its secret and social character and

has become a purely honorary organization, membership in which is conferred at graduation upon those students of colleges of first rank who have made a uniformly-high scholarship average throughout their college course.

PHIDIAS, *fid' i-as*, the greatest of Greek sculptors, was born about 500 B. C., at Athens, and was the central figure in the stupendous art activity that helped to make the age of Pericles the most brilliant period of antiquity. Little is known of his life and the close of it is shrouded in mystery. It is probable that he was a victim of the political enemies of Pericles and that he died in prison.

The Parthenon sculpture has been attributed to him and it is probable he designed it, leaving the execution to his great pupils Alcamenes and Agoracritus. Phidias worked almost exclusively in ivory, gold and bronze, and rarely in marble. Among the earliest of his great works was a large group in bronze at Delphi including Apollo, Athena and several Attic heroes. To him has been attributed the colossal bronze statue of *Athena*, on the Acropolis at Athens, which was visible far out at sea. He made several other statues of Athena, but the greatest of such representations was the colossal ivory and gold statue of the goddess which stood within the Parthenon. Thus and the ivory and gold statue of *Zeus* at Olympia were the sculptor's crowning achievements.

None of the works of Phidias have come down to us; we know of his greatness only through ancient critics and historians. From them we know that he must have been a man of noble ideals, with a complete mastery of technique, and that his work was the highest expression in plastic art of the best culture of Greece. He idealized the human form and embodied in it superhuman power and divine majesty and grace. See **PARTHENON**.

PHI KAPPA PHI, a college society to which admission is extended only for unusually meritorious work during the college course. Membership is restricted to not more than one-third of the graduating class of each year, and election occurs a year before graduation. After graduation and experience in the affairs of life a person may be elected to honorary membership if he has distinguished himself in science, education or literature. The fraternity has organizations in about 50 of the leading American colleges and universities.



PHILADELPHIA, *fil a del' fe a*, PA., the metropolis of the state and the third largest city in the United States, has a unique place in American annals. Its historic Independence Hall sheltered the patriots who signed the Declaration of Independence, and the statesmen who drafted the Federal Constitution. In a quaint old house on Arch Street the first national flag was designed and made, and the building is still standing

in which Washington was inaugurated for his second term as President, and which served as the meeting place of Congress during the period from 1790 to 1800. Philadelphia was the capital of the young nation throughout that decade.

The city was dominated by Quakers in the early period of its history, and its name is singularly appropriate, for it means *city of brotherly love*. Philadelphia is frequently known also as the **QUAKER CITY** and as the **CITY OF HOMES**. The last term is especially appropriate, for in no other city in America are found so many individual homes owned by their occupants. About 428,000 out of 491,000 buildings are dwelling houses, while apartment buildings are in the minority. All of the older buildings and many of those of later construction are of red brick, and many of the houses have wide marble steps and trimmings, a style of architecture which gives Philadelphia a peculiar individuality.

Location and Transportation. Philadelphia is the county seat of Philadelphia County. It is situated on the Delaware River, at its confluence with the Schuylkill, about 100 miles from the ocean, ninety miles southwest of New York, 136 miles north of Washington and 822 miles southeast of Chicago. Railway transportation is provided by the Pennsylvania, the Reading, the Baltimore & Ohio, and other railroads. There are 1,100 miles of railroad tracks within the city limits, freight stations and yards number 220, and numerous passenger stations include six metropolitan terminals. The city uses ten airports and landing fields. Four large aircraft lines connect with all parts of the continent.

More than 13,000,000 vehicles pass over the Delaware River Bridge each year. Some of the oldest highways in America pass through Philadelphia, reaching to both oceans and to the northern and southern states of the Atlantic seaboard.

Within the city special effort has been made to solve transportation problems. On Broad Street a six-mile subway is connected with existing subways and elevated railroads. It is possible to travel between the business district and almost any section of the city for a single fare.

General Description. The city extends for twenty-two miles along the Delaware, and in breadth from east to west it varies from six to ten miles, its area being about 130 square miles. The older part occupies the ground between the Delaware and Schuylkill rivers; it contains the business center and most of the leading industrial establishments. The streets run north and south and east and west. Those parallel with the Delaware are numbered and begin with the one nearest the river. Those extending east and west are named. Market Street, the chief business thoroughfare running east and west, divides the city into north and south sides, and Broad Street, the chief north and south thoroughfare, divides the portion between the rivers into east and west sides. These two streets intersect at the city hall. That part of the city beyond the Schuylkill is known as West Philadelphia. In the older part of the city the streets are quite narrow, and in a few of them street cars can run in only one direction, but the residential sections and the newer parts of the city have wider thoroughfares.

Parks. The park system began with the original plan of the city in the establishment of numerous small parks, known as *squares*. These are distributed throughout the more densely populated sections, and many of them are noteworthy for the beauty of their trees, shrubbery and statuary. On the south side of the city is League Island Park, of 275 acres, adjoining the navy yard, which is on an island of the same name. In the heart of the city are found Jefferson Square, Rittenhouse Square, which is in the center of the best residential section, Washington Square, Independence Square, Franklin Square, and Logan Square, but by far the most important of the city's pleasure grounds is Fairmount Park, containing near-

ly 3,600 acres. This is located on the west side of the city and is divided by the Schuylkill into East Park and West Park. Another portion, extending along the Wissahickon is known as the Wissahickon Valley. This is a deep ravine which has been preserved almost in its natural state.

Fairmount Park contains many objects of historic interest. Among these is the cottage of William Penn, the first brick building erected in Philadelphia, which has been transferred from its original site, on Lehigh Street, near the river. On Lemon Hill is the house in which Robert Morris lived during the Revolutionary War. At the Green Street entrance of the park is the Washington Monument, which was erected by the Society of the Cincinnati at a cost of \$250,000. There are also a number of statues of noted men, including those of Goethe, Schiller, Columbus, Lincoln, Grant, Meade and Garfield. This park contains many miles of drives and boulevards and over ten miles of bridle paths. In the southern portion of the West Park was located the Centennial Exposition held in 1876. Two of the original buildings, Horticultural Hall and Memorial Hall, still remain. The former contains a fine collection of tropical plants, and the latter is now an art gallery and museum. Adjoining this part of the park on the south is a zoological garden, which contains one of the finest collections of animals in America. The parks cover about 6,400 acres, in addition there are 45 playgrounds and recreation centers and 39 open air swimming pools.

Buildings. Philadelphia contains a number of buildings of historic interest, and these have been carefully preserved. Carpenter's Hall, on Chestnut Street, between Third and Fourth, is a plain two-story brick structure, in which the First Continental Congress met in 1774. Independence Hall, around which cluster the most interesting associations, is on Chestnut, between Fifth and Sixth streets. It contains many of the articles of furniture used by the old Congress and by the Constitutional Convention, as well as the old Liberty Bell which was rung at the passage of the Declaration of Independence. The Betsy Ross house, on Arch Street above Second, is the house in which the first American flag was made. The old London Coffee House, which in Revolutionary times was frequented by the leading men of the city

and nation, stands on the corner of Front and Market streets. The Girard National Bank was originally built for the first United States Bank, and Christ's Church, on Second and Market streets, begun in 1695, is one of the oldest buildings in the city. In historic buildings Philadelphia equals Boston.

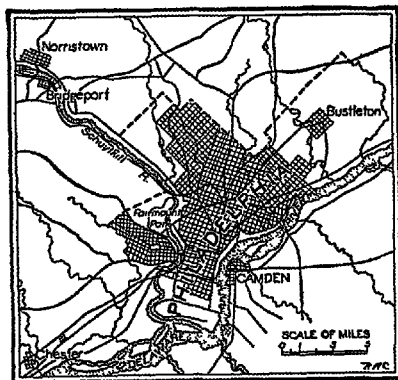
The magnificent Parkway begins at the heart of the city and extends more than a mile to the entrance to Fairmount park; it contains many notable structures. First among the modern buildings, in importance and interest, is the city hall, usually known by Philadelphians as the "public building." This structure occupies nearly all of the square at the intersection of Market and Broad streets. It is 486 feet by 470 feet, is constructed of marble, has a height of ninety feet, with corner pavilions rising to 161 feet, central pavilions to 203 feet, and a tower surmounted by a colossal statue of Penn thirty-seven feet high, the top of which is 548 feet from the ground. This building is occupied by the county and city offices, and has cost, including erection and furnishings, nearly \$25,000,000. The tower contains a clock with dials thirty feet in diameter. Next in importance are the Federal

the Arcade building, the Betz building, the Commonwealth Trust building, the Drexel building and the terminal stations of the Pennsylvania and the Reading railroads. The Bourse building is the home of the Board of Trade, and contains a large commercial museum. Among the churches, the most important are the Roman Catholic Cathedral, the largest church in the city, the Arch Street Methodist Episcopal, the Holy Trinity, the Friends' Meeting House, on Arch Street, and the First Presbyterian. Some of America's greatest hotels are in the city.

Institutions. Chief among the educational institutions is the University of Pennsylvania, occupying a beautiful site west of the Schuylkill and south of Market Street. Next is Girard College, in the northern part of the city. This is one of the most heavily-endowed educational institutions in America. Temple University has a very large enrollment. The Drexel Institute has attained a wide reputation as an industrial school. Besides these there are many other colleges and secondary schools maintained by different religious organizations. Bryn Mawr College, a famous college for women, is located a few miles from the city. In the line of scientific and art education should be mentioned the Academy of Natural Sciences, the Franklin Institute, the School of Industrial Art, Academy of Fine Arts, Johnson Art Collection, Academy of Music, Commercial Museum, Horticultural Hall, Botanical Gardens, and the American Philosophical Society.

Philadelphia is well supplied with libraries. The special libraries council of the city reports 155 libraries and fifteen private collections to which access may be had on request. That of the Library Company, which is the public library, has over 250,000 volumes, and maintains, besides the central library, fourteen branches in different parts of the city. The University of Pennsylvania, Girard College, Drexel Institute and other institutes also have large libraries. Among the institutions of a charitable nature are the hospitals for the insane, the general and the municipal hospitals and the Pennsylvania Hospital, founded in 1751, at the instigation of Benjamin Franklin. In addition to these are numerous charitable institutions maintained by the different religious denominations of the city.

Commerce and Industry. Philadelphia is one of the great industrial centers of the coun-



buildings, including the United States mint, on Spring Garden Street, the post-office, which occupies the site of the first President's mansion, on Market and Chestnut, between Ninth and Tenth, the customhouse, near the river, and the arsenal, on the south side of the city, near the Schuylkill.

Other buildings, worthy of note because of their architecture, are the Art Museum, the Masonic Temple, the Odd Fellows' Hall, the Young Men's Christian Association building,

try, being exceeded only by New York and Chicago in this respect. It holds first, second or third place in the Union in the manufacture of steam locomotives, street railway cars, iron and steel goods, carpets and rugs, foundry products, refined sugar and petroleum, worsteds, chemicals, cordage and fertilizers, and it outranks all other cities in value of total production of textiles. The city is also a great center of printing and publishing, and is the headquarters of the mammoth Curtis Company interests. Among its great industrial establishments are the Baldwin Locomotive Works, the largest of the kind in the world, and shipyards in which are built some of the largest and best ships made in the United States, these shipyards are the largest on the American continent. The annual value of manufactured goods approaches \$440,000,000, 584 plants are engaged in printing and publishing, 507 deal in bakery products, 413 in men's clothing, and 230 in women's and children's clothing.

The Delaware admits the largest ocean steamers. Philadelphia is the second port of America and has an extensive foreign commerce. The city is also an important receiving and distributing center for those portions of the country reached by the divisions of the Pennsylvania, the Baltimore & Ohio and the Reading railroads. The harbor provides 267 wharves, 60 piers are waterfront terminals of trunk line railroads. The Philadelphia Tidewater Terminal has 1,000,000 square feet of covered space and docking facilities.

History. The first settlement was made in 1636 by Swedes, and was named *Wicaco*. The first English settlement was made in 1681 under Captain William Markham, who came to the country as deputy governor under William Penn. The colony grew rapidly, and within four years it had over 2,500 inhabitants, most of whom were Quakers. A few Germans also settled in Germantown, now within the city limits, and the influence of these two classes affected the life of the town for many years. The city was chartered in 1701. During the Revolutionary period Philadelphia was the center of political activity, and was the capital of the colonies. It was occupied by the British for nearly a year, from September, 1777, to June, 1778. Conspicuous among the notable men of this period was Benjamin Franklin. From 1755 until near the middle of the nineteenth cen-

tury it was the chief city in wealth, commerce and culture in the country, but with the completion of the Erie Canal, in 1825, New York received advantages that attracted to its harbors much of the commerce that formerly came to Philadelphia. In 1854 the city was extended to the limits of Philadelphia County, and eleven villages were annexed. The Centennial Exposition of 1876, and the Sesqui-centennial Exposition in 1926, celebrating the anniversaries of the signing of the Declaration of Independence, were milestones of its later history.

Philadelphia has enjoyed the transformation from a thrifty colonial trading center into a growing city with factories and shipyards, then it became a city with paved streets and electric lights only to be again almost transformed in the reconstruction of the twentieth century. Population, 1930, 1,950,961.

Related Articles	Consult the following
titles for additional information	
Centennial Exposition	Liberty Bell
Delaware (river)	Penn. William
Drexel Institute	Pennsylvania,
Franklin, Benjamin	University of
Girard College	Ross, Betsy
Independence Hall	

PHILAE, *fil'e*, a small uninhabited island in the Nile, on the borders of Nubia and Egypt, just above the first cataract and about five miles south of Assuan. It contains some of the most remarkable ruins in Egypt, including obelisks, temples and monuments. The most ancient of the temples was erected by Nectanebo II, about four centuries B.C. There is an imposing temple to Isis, to whom the island was especially sacred. The great dam, a short distance below Philae, threatens the extinction of the ruins, in fact, during several months of the year only the tops of the ruins are discernible above the inundation.

PHILEMON See BAUCIS and PHILEMON.

PHILIP, *fil'ip*, of Bethsaida, one of the Twelve Apostles. Later he and Andrew carried a message of the Greeks to Jesus, and these two alone of the disciples were present at the feeding of the five thousand. Philip seems to have been of an inquiring mind, and, though lacking deep spiritual insight, was loyal to duty and zealous in the Master's cause.

PHILIP, the Evangelist, often confounded with Philip, the apostle, is first mentioned in *Acts VI, 5*. He preached at Smyrna, where Simon Magus was one of his converts, he baptized the Ethiopian eunuch, and he en-

tertained Paul and his companion on their way to Jerusalem. Philip's four daughters are said to have had the gift of prophecy

PHILIP IV, (1268-1314), king of France, succeeded his father, Philip III, in 1285. Because of his physical beauty he was called **PHILIP THE FAIR**. His marriage to Jeanne of Navarre added Navarre and Champagne to his domain; war with Flanders resulted in the accession of the Walloon territory to France. One of the chief events of Philip's reign was his struggle with the Papacy. In this he convoked the first States-General. The Pope was seized and imprisoned, his office was filled by an adherent of the king and the papal residence was changed to Avignon, which remained the seat of the Papacy for seventy years. It was a part of Philip's policy to overtax the Jews and Lollards and debase the coinage. His cruel rule in Flanders resulted in revolt; in 1302 he was defeated at the Battle of Courtrai, and his ascendancy in that country came to an end.

PHILIP VI (1293-1350), king of France, the first of the dynasty of Valois. He succeeded his cousin Charles IV in 1328, and came at once into conflict with Edward III of England, who claimed the French throne as grandson of Philip IV. After defeating the Flemings at Cassel in 1332, Philip undertook a crusade. In 1337 began the Hundred Years' War with England. Taxation for wars and for the king's colossal extravagance reduced the people to pauperism, and in the later years of Philip's reign a terrible pestilence, known as the "black death," swept over the country. See **FRANCE**, subhead *History*.

PHILIP II (1527-1598), king of Spain, whose reign marked the beginning of Spain's decline. He was the son of Emperor Charles V and Isabella of Portugal, and succeeded his father as king of Spain in 1556. His first wife was Maria of Portugal; his second, Mary, queen of England. Philip believed religious unity to be indispensable to the peace of the state, and he began his reign with the narrow policy of stamping out all opposition to the Roman Catholic faith. This policy accomplished Spain's ruin. It antagonized the Netherland provinces, his most valuable possession, and they revolted, ultimately becoming independent, it made enemies of France and England, which sympathized with the Flemings and Hollanders, it caused trouble among some of his best subjects at home, the Moriscos.

In Philip's reign the Inquisition reached its height, and he is believed to have had a hand in the Massacre of Saint Bartholomew. In his reign the "Invincible" Armada was destroyed, and Spain lost its supremacy at sea to England. Turkey and Portugal were subdued, but only temporarily. After Mary's death Philip married Elizabeth, daughter of Henry II of France, and when she died he espoused Anna, daughter of Maximilian II. Toward the close of his life he concluded with France the Treaty of Vervins and attempted treaties with England and the Netherlands, but his overtures were not encouraged.



PHILIP II

PHILIP V (1683-1746), king of Spain, the first Spanish king of the Bourbon dynasty. He was the son of the Dauphin Louis and Maria Ann of Bavaria and grandson of Louis XIV and Maria Theresa, sister of Charles II. He succeeded to the Spanish throne by the will of Charles II, who died without issue, and was proclaimed king in 1700. The rival claims of Archduke Charles of Austria led to the War of the Spanish Succession, in which France and Spain were allied against England, Austria, Denmark, Prussia, Portugal, Hanover and Savoy. By the Treaty of Utrecht, in 1713, Philip was recognized as king of Spain, but at the cost of Gibraltar, Sicily, the Netherlands and Naples. In 1714 Philip married Elizabeth Farnese, an ambitious woman, whose scheming involved him in difficulties he was too weak mentally to cope with. In 1724 Philip abdicated the crown in favor of his son Louis, but on the death of Louis a few months later, he resumed the royal power. The War of the Austrian Succession occurred in the later part of his reign. In his last years Philip was hopelessly feeble-minded.

PHILIP II (382-336 B.C.), king of Macedonia, son of Amyntas II and father of Alexander the Great (which see). He was born at Pella, and in his youth had for teachers Epaminondas and Pelopidas, the two leading Greek scholars of the day. After a short regency for the infant heir, his nephew, he made

himself king in 360 B C He secured his position by disposing of the rival claimants, defeating the Illyrians and diplomatically treating with the Athenians Aiming to make himself master of Greece, he captured one after another the towns on his border His success as an ally of the Thebans gave him a seat in the Amphictyonic Council Demosthenes, seeing the danger to Athens of Philip's rise to power, endeavored to show his countrymen the necessity of protecting themselves, but his impassioned *Philippics*, in which he advocated a defensive Greek league, were not heeded By 339 Philip established his supremacy in Thrace, and in the following year he entered Greece with his army, ostensibly as an ally and to subdue the Locrians At last the Athenians, realizing their danger, formed a league for defense, but it was too late They were completely defeated by Philip at Charonea in 338, and all Greece came under his sway Philip planned the conquest of Persia, but before his plans matured he was assassinated

PHILIP, KING See **KING PHILIP**



PHILIPPINE, *fil'pin*, or *fil'peen*, ISLANDS, a large group of islands in the Pacific Ocean, south of Japan, acquired by the United States after the Spanish-American War With their acquisition, and that of Porto Rico, another result of the same war, the United States became a colonial power and emerged from the "splendid isolation" which had been a fixed policy since the formation of the republic After

twenty years of rule in the Philippines, during which the United States taught an oppressed, backward people the value of education, sanitation and the principles of self-government, the American people had brought before them the question of giving these people their independence Continued agitation after 1920 among the population in behalf of freedom culminated in permission to form a temporary native government, effective in 1935 After a ten-year period of such rule, full independence is to be achieved See **THE COMMONWEALTH**, below

Area and Population. The Philippine ar-

chipelago, as bounded by the Treaty of Paris, has a length from north to south of about 1,000 miles and a width from east to west of about 600 miles The area is 115,000 square miles, or about the same as the combined areas of Nevada and Connecticut Within this are grouped about 7,083 islands, of which 2,441 have names The rest are mere points of land and are designated by number or simply by location The two largest islands are Luzon (40,814 square miles) and Mindanao (36,906 square miles) Belonging to the group are the Sulu Islands, inhabited by the Moro tribe The estimated population of the archipelago in 1932, including wild tribes, was 13,636,000 There are about 15,000 Americans and Europeans

Surface and Drainage The Philippine Islands rest upon an oceanic plateau, which within the archipelago is seldom more than 200 feet beneath the surface The islands consist of uplifts on this plateau and are mostly of volcanic origin, though coral formations have added somewhat to the original area of the volcanic islands The large islands are all mountainous In the main the mountains extend in north and south directions and contain numerous volcanic peaks About fifty of these are well marked, and of this number over twenty have been active within historic times, a few are now active or quiescent The highest peak is Mount Apo, in Mindanao, 9,610 feet On the islands there are a number of other peaks which exceed 7,000 feet, including Halcon, 8,868 feet, on Mindoro, and Mayon, 8,274 feet, on Luzon Along the coast of Luzon and Mindanao there are quite extensive tracts of low land, and some of the smaller islands, which are of coral formation, rise only a few feet above the sea With scarcely an exception the islands are irregular in form, and this gives them a coast line which exceeds that of the United States

Luzon and Mindanao are the only islands that have rivers of any considerable importance The chief rivers of Luzon are the Rio Grande de la Pampanga, flowing into Manila Bay, the Cagayan, draining the northern part of the island, and the Pasig, connecting Laguna de Bay with Manila Bay Though short, this stream is of great commercial importance The largest river in the islands is the Rio Grande de Mindanao, which drains the north and central parts of Mindanao and flows into Celebes Sea The islands contain

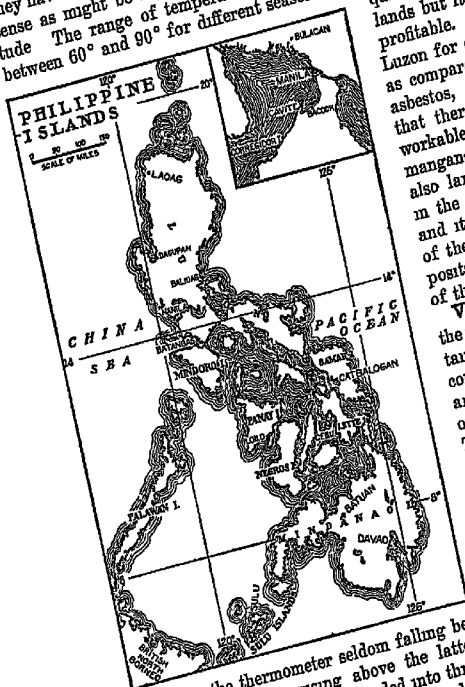
PHILIPPINE ISLANDS

2816

PHILIPPINE ISLANDS

but few lakes of importance. Of these Laguna de Bay, near Manila, and Laguna de Bombon, also in Luzon, are the best known.

Climate Although the islands lie wholly within the tropics, their extent from north to south and their variation in altitude give them a great variety of climatic conditions. While they have a hot climate, the heat is not so intense as might be supposed from their latitude. The range of temperature is usually between 60° and 90° for different seasons of



the year, the thermometer seldom falling below the former or rising above the latter point. The year is usually divided into three seasons. The first, extending from the middle of November to the middle of March, is the most agreeable. From the middle of March to the middle of July is the hot, dry season, and from the middle of July to the middle of November is the rainy season, in which the temperature is seldom higher than it is during the winter. That portion of the archipelago north of the tenth parallel of latitude is affected by the trade winds, which begin in April or May and blow for about five months. These are followed by the northeast monsoon, which continues the remainder of the

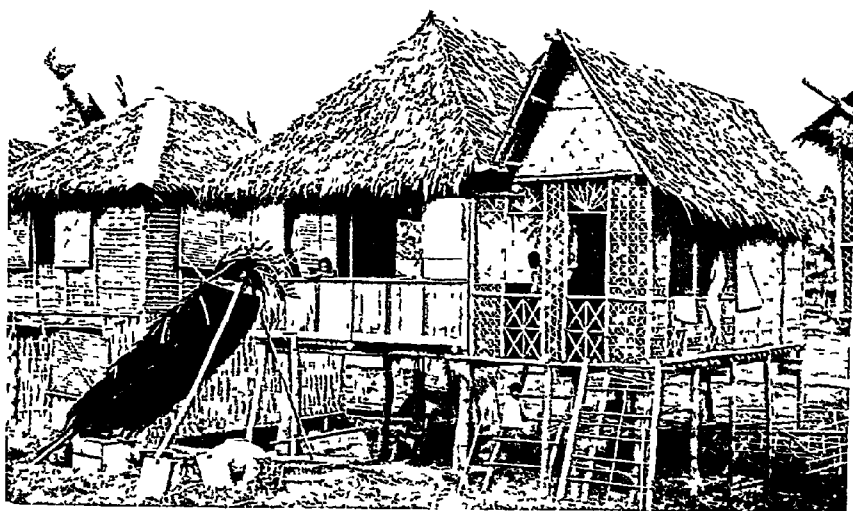
year. The islands are also visited by frequent typhoons, which are the strongest about the equinoxes. These pass over the islands from west to east and frequently do considerable damage (see **TYPHOONS**). As in other tropical regions unaffected by large mountain ranges, the rainfall is heavy, but it is unevenly distributed throughout the year.

Mineral Resources. The variety and extent of mineral resources are not fully known. Coal similar to that mined in Japan is found quite generally distributed throughout the islands but its production is not commercially profitable. Gold has been known to exist in Luzon for centuries, but it is of minor value as compared with the wealth in silver, zinc, asbestos, and marble. Estimates proclaim that there are seventy-five square miles of workable coal fields in the islands. Lead and manganese have also been found. There are also large deposits of copper and iron ore in the central and northern parts of Luzon, and it is probable that a systematic survey of the other islands will uncover similar deposits. Petroleum has been found on several

of the islands.

Vegetation About 80,000 square miles of the islands are covered with forests, which contain many varieties of hard and soft woods common in that part of the world. Among these are found gutta-percha and various species of palms, such as cocoanut, nipa and calamus. The last two are extensively used for building and domestic purposes. This forest area is directly under the control of the bureau of forestry of the Philippine government, which, through authorized agents, prevents wasteful cutting of trees and holds the land so that large areas cannot be obtained by companies seeking to gain a monopoly of the lumber industry. Bamboo, which is of very great value to the natives, is found throughout the islands, and abaca, or Manila "hemp," grows wild in some sections. There are many species of tropical plants, noticeable for their brilliant flowers or for various economic uses.

Animal Life. The islands have over sixty species of mature mammals. Some species of wild cats and civets are found, there are also bats, the most interesting of which is the flying fox, or fruit bat. One species of monkey is found, also a flying lemur. There are rats, squirrels and other small rodents. A native buffalo, called the tamarau, is found in the forests of Mindoro. The water buffalo, or carabao, has been domesticated and is

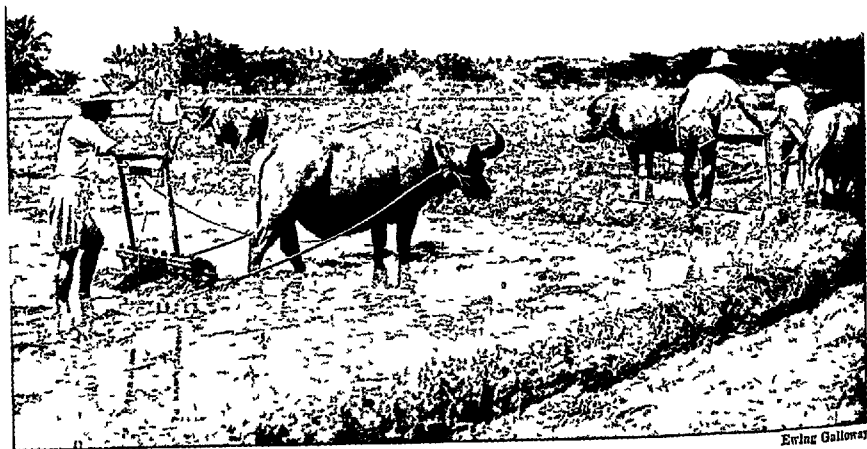
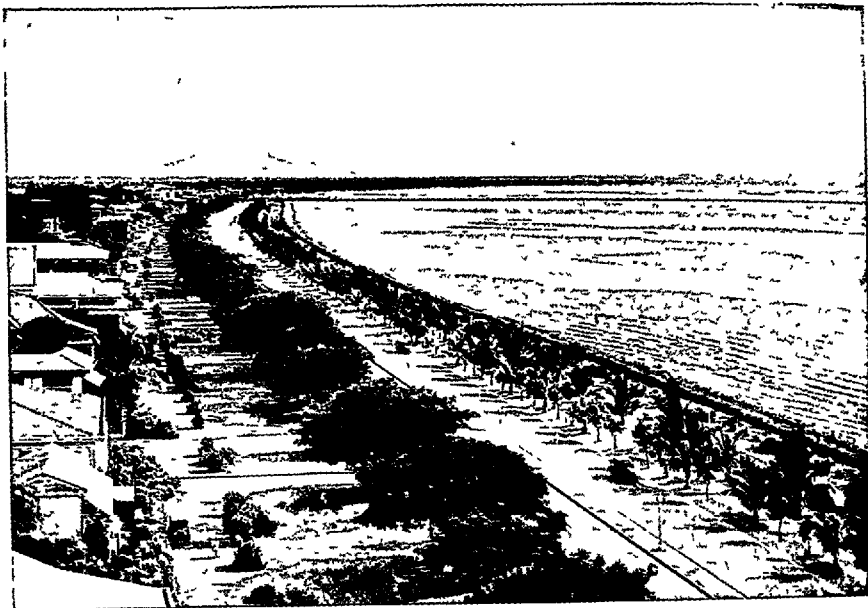


Ewing Gallonay

VIEWS IN THE PHILIPPINES

Above Cebu Island houses erected on stilts, as a protection from flood waters of nearby river Houses of the better class are neat structures of bamboo and nipa The thatch is from the nipa palm

Below City Square, Manila, vehicles of all sorts in use



Ewing Galloway

VIEWS IN THE PHILIPPINES

Above: Dewey Boulevard, along the shore of Manila Bay, as seen from the roof of University Club

Below: Carabao (water buffalo) and rice field workers, Island of Luzon

the chief beast of burden, and wild hogs are found in all of the large islands. The islands contain several species of deer, some of which have been domesticated. The domestic animals common to Europe and the United States have been introduced. Among these are a small horse, swine and sheep. Some humped cattle are found in various localities, and the breeds of cattle common in Europe and the United States have been introduced. Of birds, there are nearly 700 species. More than half of these are peculiar to the Philippines. The cockatoo and numerous species noted for their plumage are found. The largest reptiles are the python and the crocodile. Lizards are numerous, and are found in almost endless variety. The inland and coast waters contain numerous species of fish valuable for food, and the pearl oyster exists along the coasts in such numbers as to make fishing for its shell a profitable industry.

Industries. Agriculture is the most important industry of the islands, and the government is slowly educating the people away from their primitive ideas of cultivation. The soil and climate are well adapted to growing nearly all crops of the tropical regions. At present the chief crops are rice, Manila "hemp," maguey, sugar cane, tobacco and coconut. Coffee is less important than formerly, because of destructive insects, but this pest is being overcome. Cane is the largest single crop. The hemp industry has been aided by the introduction of a government system of inspection and grading, and grades of fibers are now standardized.

The manufacture of cigars and cigarettes is the most important manufacturing industry, in Manila are some of the largest tobacco factories in the world. Several large modern coconut oil factories are in operation in the islands, and central sugar mills of modern type have been established in the chief sugar-producing sections. There are other factories for the production of articles for home consumption, but the principal industries, aside from those mentioned, are those carried on in the homes or in vocational schools, such as weaving, hat and basket making, embroidering and other lines of handicraft. The characteristic handiwork of Filipino workers in textiles and basketry is fully recognized in America, where many of these products find a large and growing demand.

Transportation. Until 1905 there was but one railroad in the islands. This extended

from Manila northward 120 miles to Dagupan. There are now nearly 840 miles in operation. The work of highway construction has progressed rapidly, and about 9,500 miles of first-class surfaced roads have been built. One of the finest boulevards in the world skirts the shore of Manila Bay for fifteen miles, between Manila and the naval station of Cavite. Another marvel of road building is a mountain highway that leads to Baguio, the summer capital of the islands. Highways and railroads are under government control. All of the larger islands have been connected by telegraph, and Manila is connected with the United States and with the leading ports of Asia and Europe by cable, and Manila has airplane connection with America. A postal system is based on that of the United States.

Commerce. The commerce of the islands has never been large, but has increased rapidly since the American occupation. Manila, the chief seaport, has been opened to admit the largest ocean steamers, by the dredging of the bay and the construction of a new dock. There are several ports on the islands of considerable importance in local commerce, but the principal ports for foreign trade are Manila, Cebu, Iloilo, Zamboanga, Davao, Jolo and Legaspi. The exports are hemp, which far exceeds all other articles in value, sugar, tobacco, copra (the dried meat of the coconut), and a limited amount of manufactures. The imports consist largely of manufactured goods and foodstuffs. The chief trade is with the United States. The annual imports amount to more than \$90,000,000, and the exports reach a total of over \$120,000,000. From the tariff on imports and from internal taxes, the revenue for support of the government is derived. The coin in general use is the *peso*, valued at about fifty cents in United States money.

Inhabitants and Language. The native people consist of the Negrito tribes, generally considered aborigines, numbering between 55,000 and 60,000, and the Malay tribes, of which there are a large number. The negritos have curly hair and nearly black skin and are short of stature. They dwell in the interior and are still in a state of ignorance. In addition to these are the Igorrotes, occupying the central provinces of northern Luzon, a Malay tribe who are still in an uncivilized or partially civilized state. In general the term *Filipino* includes the seven

Christianized tribes, of which the Tagalogs, Visayans, Bicolis and Pampangans are the most important. These tribes occupy nearly all of northern Luzon, the central islands and the northern part of Mindanao. Among them are found all grades of culture, from the Barbarian to the college-educated man, but the larger portion of them are civilized. The Moros occupy a large part of Mindanao and the Sulu Archipelago.

There are nearly as many dialects in the islands as there are tribes, and no one dialect or language predominates, even in the island of Luzon, consequently, ever since Spanish occupation it has been necessary to use a foreign language as the official language of the islands. This was naturally Spanish until after the American occupation, but in 1901 English became an official language, together with Spanish in the government and the courts. The Tagalog, or Tagal, and Visayan dialects are the most fully developed of the native tongues, and these have reached such a stage of completion as to lead to the development of a limited native literature.

The people generally live in villages or cities, and are refring and simple in their habits. They have the lethargy common to native people of tropical climates; yet, when sufficient inducement is offered, they have proved willing and efficient workers. Little dress is needed to protect them from the elements, hence their attire is scanty. Their houses are constructed of bamboo, the floors are built about five feet from the ground, and the roofs are covered with nipa or some other form of thatch. Their culinary utensils and articles of furniture are of the simplest sort.

By far the larger part of the civilized Filipinos are followers of the Roman Catholic faith. The Moros, as the name indicates, are Mohammedans. The uncivilized tribes practice various religious rites of a heathen nature. There are, however, natives who are followers of the leading Protestant denominations, but these have as yet few followers.

Education. When the new temporary government (see *THE COMMONWEALTH*, below) was established, there were more than 3,000,000 children of school age (6 to 16 years), and 40 per cent of them were in attendance in nearly 8,000 public schools, there were nearly 100,000 in private schools. There is a normal school for native teacher training (only 260 Philippine teachers are American). The University of the Philippines has about 5,000 in

attendance. Other higher institutions are a School of Arts and Trades, a Nautical School, the Central Luzon Agricultural School, and the Dominican University of Santo Tomas (founded in 1611).

The Commonwealth. The First Commonwealth of the Philippines has been the official name of the island group since November, 1935, when the first Filipino President (Mannuel Quezon) was inaugurated. In 1945, at the end of a ten-year probationary period fixed by the United States for the natives to adjust themselves to self-rule, the name will be changed to Republic of the Philippines. Between 1935 and 1945 the Filipino Constitution provides for an American High Commissioner as adviser of the government.

The new Constitution, drafted by a Filipino convention at Manila, provides for a legislature of one chamber, the National Assembly, of 120 members, chosen for three years. This body retains extensive powers over the executive and judicial departments, the President is given only limited veto power, and the Supreme Court (a Chief Justice and ten Associate Justices) cannot declare a law unconstitutional except by a two-thirds vote. Freedom of the press and religion are guaranteed. The Constitution provides that all natural resources of the country belong to the state.

The President and Vice-President are elected for terms of six years, and the President is restricted to one term. In case he is deemed unworthy of his office, the road to impeachment is made easy.

Strangely, when the Constitution was adopted by popular vote in May, 1935, women participated with men in the balloting, but the document itself provided that thereafter women would be deprived of the ballot until 300,000 of them demand it.

Congressional Action. The Philippine Independence Act (the Tydings-McGuffey Bill) was passed by the American Congress in March, 1934.

History. Magellan discovered the islands in 1521 and lost his life battling with the natives. After several ineffectual attempts at settlement by the Spaniards, the first colony was established in 1565 on the island of Cebu. From this foothold the Spaniards proceeded to occupy one island after another, until they had obtained control of nearly the entire archipelago. The occupation was followed by the work of the religious orders, who established

missions among the natives and used every effort to convert them to Christianity. During the seventeenth century the islands suffered somewhat from the war between the Dutch and the Spanish, and in 1662 they were raided by Chinese pirates. Following this, for a period of a century the islands were left without disturbance. Because the main object of the occupation was to Christianize the inhabitants, and also because of opposition of Spanish merchants, no attempt was made to exploit the islands or in any way to develop their commerce. In the Seven Years' War the islands were captured by the British, but they were retroceded to Spain by the Treaty of Paris, in 1763. They then remained under Spain's control until the outbreak of the Spanish-American War in 1898, when the Spanish fleet was destroyed by the American squadron under Commodore Dewey on May 1. On August 13 Manila was captured and the islands came under American occupation. By the Treaty of Paris, which closed this war, the Philippines were ceded to the United States, and Spain received \$20,000,000 from the United States.

The cession was followed by an insurrection of Filipinos, some of whom had expected that their independence would soon be granted by America. Emilio Aguinaldo was the leader of this movement, which had been growing for years, largely inspired by the patriotic writings of Dr. José Rizal, executed as a "traitor" by the Spanish authorities in 1896, and a state of war existed until 1901, when Aguinaldo was captured, and the fighting ceased.

In 1900, a Philippine Commission with William H. Taft at its head was appointed, and in July, 1901, this commission established civil government throughout the islands, and Mr. Taft became civil governor. In 1902 Governor Taft arranged for the purchase of the land owned by the Catholic friars who had been compelled to flee from the islands, and in 1903 a general census was taken. The first Philippine Assembly was opened on July 30, 1907. Under W. Cameron Forbes, Governor from 1909 to 1913, great progress was made, especially in matters of health and education. Small-pox and other epidemic diseases were practically eliminated. The man directly responsible for these results was Dr. Victor G. Heiser, Director of Public Health.

In 1916, Congress passed the Jones bill,

which encouraged the Filipinos to look for early independence. This bill provided for an extension of powers to native Filipinos, giving them a large measure of control in the government. Francis Burton Harrison became governor-general, and proved to be sympathetic with the demand for independence. Under his administration the Philippine Government organized a bank and went into other industrial enterprises, which were so badly managed that the Government suffered huge losses. Health regulations were not maintained, and small-pox and other epidemics broke out in full force.

Under the leadership of two prominent Filipinos, Manuel Quezon, President of the Senate, and Sergio Osmena, Speaker of the House, many laws were passed, calculated to weaken American control. In 1920 they led a native mission to Washington bearing documents and arguments in proof of their ability to establish a stable independent government. Congress took no action, and President Harding sent Leonard Wood to the islands to report on the situation. General Wood's report was adverse to the independence movement, and in October, 1921, he was appointed Governor-General of the islands.

Under the administration of General Wood the finances were restored to a sound basis, independence propaganda was partially arrested, the public health service was reestablished. An independence plebiscite bill was vetoed by the Governor-General, passed again by the legislature, and finally vetoed by President Coolidge.

General Wood died in 1927, and was succeeded by Henry L. Stimson (1928), Dwight F. Davis (1929), Theodore Roosevelt (1932), Frank Murphy (1933). In January, 1933, the American Congress passed an act (the Hawes-Cutting Bill) granting independence to the Philippines, but it was vetoed by President Hoover on moral, political, and economic grounds. In 1934 the Tydings-McGuffey Bill was passed. This act provided that the Philippines should frame a Constitution within two years that would be acceptable to the United States, and that ten years should elapse before American authority should be entirely withdrawn from the islands.

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PHILISTINES, *fil is'tins*, a mixed people who in Biblical times inhabited the western coast of Palestine. Their five chief cities, Gaza, Gath, Ashdod, Ashkelon and Ekron, formed a sort of confederation, under five lords, or chiefs. The Philistines are frequently mentioned in the Bible as enemies whom the Israelites constantly feared, and whom they ultimately conquered under the leadership of David. The giant Goliath and Delilah, who betrayed Samson, were both Philistines.

PHILLIPS, **WENDELL** (1811-1884), an American orator and reformer, was born at Boston, Mass. He was graduated from Harvard College in 1831, and was admitted to the bar in 1834. However, the question of the abolition of slavery so absorbed his attention that he deserted his profession to champion that cause. A speech in Faneuil Hall, in 1837, against the murderers of Lovejoy, at Alton, Ill., made him at once the principal orator of the anti-slavery party; and thereafter, until Lincoln's Emancipation Proclamation, he was a leader in the struggle.



WENDELL PHILLIPS

He also championed the cause of temperance, of women's rights, of the Indians, of prison reform and of labor. In 1870 he was nominated for governor by the Prohibitionists and the labor party. He was long a conspicuous lyceum lecturer, and his wit, use of epigram and invective, as well as apt illustration, place him in first rank among American orators. His addresses on *Toussaint l'Ouverture*, *The Lost Arts* and *The Scholar in a Republic* are notable examples of his power.

PHILOLOGY *fil o'lo jy*, or **COMPARATIVE PHILOLOGY**, terms commonly used to mean the science of language, otherwise called *Linguistic Science*, or *Linguistics*. This science treats of languages as a whole, of its nature and origin, and of the different languages of the world in their general features, attempting to classify and arrange them and to settle in what relationship each stands to the others. That every language has a life

and growth is true in a sense, for languages are continually in a state of change.

What is Language? A language is a system of vocal sounds, through which ideas are conveyed from person to person, in virtue of the fact that certain ideas are attached to, or belong to, certain sounds by a sort of general understanding existing among those who use the language. That there is any natural law by which one idea belongs to one vocal sound rather than to another can hardly be affirmed, in view of the fact that if we select any one idea, we shall find that each of the thousand languages of the world expresses this idea by a different sound or group of sounds. Indeed, ideas can be conveyed otherwise than by vocal sounds, as witness the elaborate sign language that has been developed in some communities and the finger language of the deaf and dumb.

Origin of Languages. As to the origin of language, nothing is really known. We suppose that the earliest men had no language, but having suitable organs for speech they devised a language among themselves as a means of intercommunication. We may conclude that the earliest attempts at speech were either in imitation of the different sounds heard in nature or that they were based on the inarticulate utterances or cries by which human beings naturally gave vent to different emotions. However language originally arose, it is very certain that whatever language we speak has to be acquired from others who have already learned to speak it, and that those others have similarly acquired it from their predecessors, and so on backward into the darkness of the remotest ages. Every language is thus at our birth a foreign language to all of us.

The science of philology is of modern origin, being hardly, if at all, older than the nineteenth century. Already most valuable results have been attained and a large number of languages have been studied and classified; yet much remains to be done, and much remains uncertain and must always remain so.

One great difficulty that the philologist has to grapple with is that only a very few tongues possess a literature dating from before the Christian Era and that the greater number have no literature at all.

Teutonic Group. Philology has succeeded in showing that the English language is one of a group of closely allied languages, which are known by the general name of the Teu-

tomic, or Germanic, tongues. The other languages of the group, some of which are more closely connected with English than the rest, are Dutch, German, Danish, Icelandic, or Old Norse, Swedish and Gothic, to these may be added, as of less importance and having more of the character of dialects, Norwegian, Frisian, Plattdeutsch, or Low German of northern Germany, and Flemish, which differs little from Dutch. The Teutonic tongues are often divided into three sections, based on closeness of relationship—the High German, of which the modern classical German is the representative, the Low German, including English, Dutch, Frisian, Plattdeutsch and Gothic, and the Scandinavian, including Danish, Swedish and Icelandic. Another division is into East Germanic, including Gothic and Scandinavian, and West Germanic, including the others.

The evidence that all these languages are closely akin is to be found in the great number of words that they possess in common, in the similarity of their structure, their inflections, their manner of compounding words—in short, in their family likeness. This likeness can be accounted for only by supposing that these languages are all descended from one common language, the primitive Teutonic, which must have been spoken at a remote period by the ancestors of the present Teutonic peoples, there being then only one Teutonic people as well as one Teutonic tongue. In their earliest form and when they began to be differentiated, these languages must have had the character of mere dialects, and it is only in so far as each has had a history and literature of its own that they have attained the rank of independent languages.

The rise of dialects is a well-known phenomenon, taking its origin in the perpetual change to which all languages are subject. A language that comes to be spoken over a considerable area and by a considerable number of persons—especially when not yet firmly fixed by writing and literature—is sure to develop dialects, and each of these may in course of time become unintelligible to the persons using the others, if the respective speakers have little intercourse with each other. In this way is the existence of the different Teutonic tongues to be accounted for. A similar instance of several languages arising from one language is seen in the case of Italian, French, Spanish and Portu-

guese, all of which are descended from the Latin. Of the common origin of these, we have, of course, direct and abundant evidence.

Aryan Group. The Teutonic tongues, with the primitive or parent Teutonic, from which they are descended, have been proved to belong to a wider group or family of tongues, which has received the name of Aryan, Indo-European, or (especially in Germany) Indo-Germanic family. The chief members of this family are the Teutonic, Slavonic (Polish, Russian, Lithuanian), Celtic (Welsh, Irish, Gaelic), Italic, or Latin, Hellenic, or Greek, Indic, or Sanskrit, Iranian, or Persian, and Anatolic, or Armenian. Just as the Teutonic tongues are believed to be the offspring of one parent Teutonic tongue, so this parent Teutonic and the other members of the Aryan family are all believed to be descended from one primitive language the Aryan, or Indo-European, parent speech. The people who spoke this primeval Aryan language, the ancestors (linguistically at least) of the Aryan races of Europe and Asia, are believed by many to have had their seat in central Asia, to the eastward of the southern extremity of the Caspian Sea. This, however, is very problematical, and some philologists see reason to think that Europe may have been the original home of the Aryans. This latter view is now perhaps the one most generally held.

How remote the period may have been when the ancestors of the Teutons, the Celts, the Slavs, the Greeks, the Romans, the Persians and the Hindus were living together and speaking a common language, is uncertain. Yet the general character of their language is approximately known, and philologists tell us with some confidence what consonant and what vowel sounds the Aryan parent speech must have possessed, what were the forms of its inflections, and what, at the least, must have been the extent of its vocabulary, judging from the words that can still be traced as forming a common possession of the sister tongues of the family.

Semitic Group. The Aryan tongues, ancient and modern, are entitled to claim the first rank among the languages of the globe, as to richness, harmony and variety, and especially as embodying a series of literature to which no other family of tongues can show a parallel. Next in importance come the Semitic tongues—Hebrew, Chaldee, Syriac, Arabic and their related tongues. These, like

the Aryan tongues, form a well-marked family, one notable peculiarity of which is the possession of "trilateral" roots, or roots of which three consonants form the basis and give the general meaning, while inflection or modification of meaning is indicated by internal vowel-change. Thus the vowels play a subordinate part to the consonants and do not, as in the Aryan tongues, associate with them on equal terms.

Other Languages Other important linguistic families are the Hamitic, which includes ancient Egyptian, Coptic, Berber and Ethiopian; the Turanian, or Scythian, which includes Turkish, Finnish and Mongolian, and the Southeastern Asiatic, which includes Chinese and Siamese. Other families of languages are the Malayo-Polynesian, of the Indian Archipelago and the Pacific, the Bantu, a great family of South Africa, and the American Indian languages, which are characterized as polysynthetic from the way in which they crowd as many ideas as possible into one unwieldy expression. All these families form groups, so far as is known, separate from and independent of each other; and attempts to connect any two of them, as Aryan and Semitic, for instance, have met with little success.

Related Articles Consult the following titles for additional information

Alphabet	Italian Languages
Americanisms	Languages of the
Aramaic	World
Chaldean Language	Latin Language
Consonant	Plattddeutsch
Cuneiform Inscriptions	Provençal Language
Dialect	Romance Languages
Diphthong	Rosetta Stone
English Language	Runes
Esperanto	Sanskrit Language and
Etymology	Literature
French Language	Semitic Language
German Language	Sign Language
Greek Language	Syllable
Hebrew Language	Visible Speech
and Literature	Yolapik
Hieroglyphics	Vowel
Iranian Languages	Writing

PHILOMELA, *fil o'méla*, in Greek mythology, daughter of Pandion, king of Athens. Her sister Procne was the wife of Tereus, king of Thrace, and they had one son, named Itys. Tereus, growing tired of his wife, imprisoned her, and he cut out her tongue so that she could tell no one. Then pretending his wife was dead, he married Philomela. But Procne made known her wrongs to her sister by embroidering her story in tapestry. Then the two, in revenge, murdered Itys and offered him to his father as food. This act so angered the gods that

they changed Philomela into a nightingale and Procne into a swallow and they were thenceforth pursued by Tereus, who was changed into a hawk.

PHILOSOPHER'S STONE. See **ALCHEMY**.

PHILOSOPHY, *fil os' o fy*, from two Greek words meaning *love of wisdom*, is a term having a number of definitions. In general it signifies the body of highest truth. Philosophy has also been defined as "the science of things divine and human, and the causes in which they are contained." Among the ancient Greeks philosophy meant general culture, because it included all knowledge. With the advance of knowledge a more definite and complete classification became necessary, and much that was formerly considered belonging to philosophy is now covered by such sciences as physics, ethics, logic, psychology and metaphysics, so that it is now somewhat difficult to draw a dividing line between philosophy and these sciences. Philosophy has been called "the mother of the sciences" and "the science of sciences," and these definitions are not far-fetched, for philosophy is really the study of all sciences, considering the relation of each to all the others. Herbert Spencer has defined philosophy as "a system of completely united knowledge."

The Early Period So far as known the early Greeks were the first to give philosophy a definite meaning, their first philosopher of whom there is any record was Thales, who founded the Ionic school, 600 B. C. Socrates was a moral philosopher, and his teaching led to the founding of a number of schools of Greek thought, among them being the cynic which was a forerunner of the *stoic* and the *Epicurean* schools. Aristotle organized the sciences on an ideal basis, and Plato constructed a complete system of idealistic philosophy. The influence of these great teachers has affected the trend of thought to the present time.

The Romans borrowed their philosophy from the Greeks. Their *eclectic system*, represented by Cicero, was a combination of parts of the various Greek schools. Its chief influence consists in the handing down a name which through the centuries has been applied more or less loosely to various systems of science and to schools of art and learning.

The Middle Period Other nations besides the Greeks and Romans shared their philosophy, but the Greek thought determined the

philosophy of the Middle Ages, which produced the system known as Scholasticism. Its chief characteristic was its application of Aristotle's logic to the basic doctrines of the Church. Abelard, Anselm, Duns Scotus and Saint Thomas Aquinas were the most noted advocates and teachers of the system.

The Modern Period The philosophy of the middle period imperceptibly blends with the new philosophy of Bacon and Descartes, who are considered the founders. Bacon, following the plan of Aristotle, reasoned from known facts to general truths and principles. He was the founder of *inductive philosophy*, which since its acceptance has been in general use in scientific research. Descartes, on the other hand, reasoned from the general truths formulated in the mind to individual truths and facts. He was the originator of the famous expression, "I think, therefore I am." Descartes founded the *deductive system* and his method of teaching is in general use in higher mathematics and in some other high school and college subjects. These systems are direct opposites. Bacon believed in reasoning from the known to the unknown, Descartes in reasoning from the unknown to the known. Both have their points of advantage and their limitations. The inductive method may be considered the method of discovering truth, the deductive, that of applying knowledge. Their happy combination lies at the foundation of the great educational systems of the present day.

Later thinkers have done but little, except to elaborate or modify the systems of their predecessors. The utilitarian school headed by John Stuart Mill and the Transcendental school, founded in the United States by Emerson and his followers, are among the most widely-known philosophic systems of recent times. Among the most distinguished philosophers of recent years are Herbert Spencer, Charles Darwin, John Stuart Mill, Locke and Hume in England, Cousin, Voltaire and Bergson in France, Hegel, Kant, Herbart, Lotze, Nietzsche and Schopenhauer in Germany, and William James in the United States.

Related Articles Consult the following titles for additional information:

GENERAL

Agnosticism	Induction
Altruism	Inductive Method
Asceticism	Logic
Deduction	Materialism
Deductive Method	Metaphysics
Ethetics	Nihilism
Ethics	Optimism
Fatalism	Pantheism

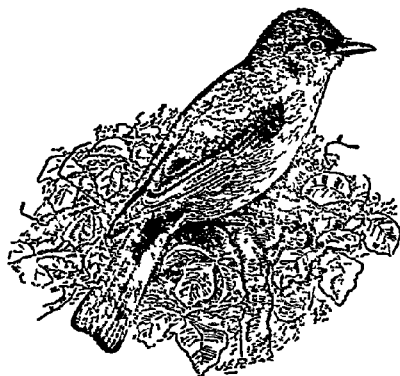
Peripatetic School of Sophists
Philosophy
Pessimism
Psychology
Rationalism
Scholasticism
Stoicism
Transcendentalism
Transmigration of the Soul
Utilitarianism

PHILOSOPHERS

Abelard, Pierre	Kant, Immanuel
Aristotle	Leibnitz, Baron von
Bacon, Francis	Locke, John
Bacon, Roger	Mill, James
Bergson, Henri L.	Mill, John Stuart
Comte, Isidore Auguste	Newton, Sir Isaac
Darwin, Charles R.	Nietzsche, Frederick
Descartes, René	Plato
Dewey, John	Pythagoras
Diogenes	Schopenhauer, Arthur
Emerson, Ralph Waldo	Seneca, Lucius
Epictetus	Annaeus
Epicurus	Socrates
Fichte, Johann Gottlieb	Spencer, Herbert
Hegel, Georg W. F.	Spinoza, Baruch
Herbart, Johann F.	Thales
Hume, David	Voltaire
Hypatia	Zeno
James, William	

PHLOX, *flax*, a group of dainty flowering plants, natives of North America. The name, derived from a Greek word meaning *to burn*, is apropos of the flaming purple and crimson blossoms of some wild species which sprinkle the meadows in spring and early summer. Phlox are among the most satisfactory of all garden plants. They are hardy, they bloom in profuse clusters and are remarkable for purity and transparency of color. *Drummond's phlox*, a native of Texas, is the parent of most cultivated varieties of small phlox. The blossoms derived from this source display a wonderful range of color, white, pink, magenta, lilac, purple and red. Florists have succeeded in producing several varieties of giant phlox which grow to a height of six or seven feet.

PHOEBE, *fe'be*, or **PEWEE**, a little olive-



PHOEBE

green bird of the tyrant flycatcher family, very common in America and named from its

call. It builds its compact little nest under bridges, on the beams, very near the water. It is a well-constructed nest of mud and moss, lined with cotton or some other soft substance. Two broods are raised in a season, and when summer is over the birds migrate to the South. See KINGBIRD, WOOD PEWEE.



PHOENICIA, *fe-nish'i-a*, a part of the Canaan of the Old Testament, was a narrow country bordering the eastern coast of the Mediterranean Sea and extending from Mount Carmel northward to the Eleutheros, a distance of 200 miles. On the east the mountains of Lebanon separated it from the country beyond Phoenicia was the first great commercial power known

to history, and one of the important nations of antiquity. Its beginnings are unknown, but as early as 1500 B. C. it was a nation with a long history. The Phoenicians were of Semitic origin and were related to the Israelites, with whom they were almost constantly at war until the reign of David. In the Old Testament they are also called *Sidomans*.

Their greatest contribution to civilization was the alphabet, which they are credited with inventing. They also were noted for their knowledge of the art of writing, for their skill in mining, in building and in casting metals, and for their manufacture of glass, of cloth and of purple dyes. Like the people of most commercial cities, they were lovers of peace and fond of luxury. Their religion resembled that of the Assyrians, but was even more cruel and debasing. Their chief deities were Astarte, the moon-goddess or goddess of love, and Baal, the sun-god, to whom it was customary to sacrifice every first-born child. They were never united under one ruler, but each city was a sovereignty in itself. Their literature seems to have been very scanty, consisting chiefly of annals, and it has been almost entirely lost. About 1000 B. C. the Phoenicians planted a trading settlement at Cyprus. After Cyprus, the southern coast of Asia Minor, the islands of the Aegean Sea, the northern coast of Africa, southern Spain, Sicily and Sardinia were colonized by them. Not only did they carry on a brisk trade with these colonies, but they

became the carriers of merchandise between all the markets of the world. Their vessels carried tin from England, gold, pearls and frankincense from Arabia; silver from Spain, slaves, ivory and panthers' skins from Africa; linen from Egypt; copper from Cyprus; purple from Tyre, and cunningly wrought silver and brazen vessels from Sidon.

The principal cities were Tyre and Sidon, the former noted as the center from which Phoenician colonization proceeded, and the latter for its harbor and commerce. Carthage, for many years the rival of Rome, was the most important colony. Although the Phoenicians became subject to other nations after 850 B. C., they maintained their commercial independence until their conquest by Alexander, 332 B. C.

Related Articles. Consult the following titles for additional information:

Alphabet	Carthage	Syria
Beirut	Sidon	Tyre

PHOENIX, *fe-niks*, a fabulous bird, held sacred by the ancient Egyptians. It was said to be the size of an eagle, and to have red and gold plumage. The most popular of the stories about the bird is one to the effect that the phoenix lives 500 years, then, building a funeral pile of twigs and leaves, lights it by fanning its golden wings, and dies upon it. From its ashes a young phoenix rises. According to Pliny, the Roman historian, there was a popular belief that only one phoenix existed at a time.

PHOENIX, ARIZ., the capital and first city in the state in size, the county seat of Maricopa County, is in the south-central part of the state, about 120 miles northwest of Tucson, on the Santa Fe and the Southern Pacific railroads. The city is in a great irrigated valley, the center of interest of which is the Roosevelt Dam. There are copper mines in the nearby mountains. The city contains machine shops and stockyards and has a large trade in fruits (some of them semi-tropical), olives, honey, grain, hay and dairy products. The principal buildings are the capitol, an asylum for the insane, a courthouse, a city hall, a Carnegie Library, a Y. M. C. A., several fine hotels, an agricultural experiment station and a school of music. Nearby are Indian relics of national interest. There are eight private hospitals for patients who come here for a cure for lung trouble. The place was settled in 1870 and was incorporated in 1881. The commission form of government was adopted in 1912. Popula-

tion, 1920, 29,053; in 1930, 48,118, a gain of 65.6 per cent.

PHONETICS, *fo net'iks*, the science of elementary sounds of the human voice; also the art of representing these sounds by written or printed characters. In its broadest sense the term applies to all sounds of the voice, but in its restricted sense, and the one in which it is generally used, phonetics applies to articulate speech. The sounds combined to form articulate speech are of two general classes, those consisting of tones produced simply by the vibrations of the vocal cords, and those in which these tones are broken up and given distinct articulation by the use of the tongue, palate, teeth and lips. The first class of sounds is represented in the English alphabet by the vowels *a, e, i, o, u, y*; the second by consonants.

Since the English language has forty elementary sounds and there are but twenty-six letters in the English alphabet, some of these letters have to represent more than one sound. This peculiarity makes English somewhat difficult for foreigners to learn to speak and for children to learn to read.

Phonics. In its original meaning phonics is the art of combining musical sounds, but the term is now very generally applied to the art of teaching children the sounds represented by the letters of the alphabet when they first learn to read. Various methods of teaching phonics are in use, but they cannot be described in an article of this length. For a full description of these methods the reader is referred to the primers and first readers of the various series of school readers.

For the different sounds represented by the letters of the alphabet and the methods of mastering the phonetic difficulties of the language, see **ORTHOGRAPHY**.

PHONOGRAPH. See **TALKING MACHINE**.

PHONOGRAPHY. See **SHORTHAND**.

PHOSPHATES, *fahs'fayts*, compounds of phosphoric acid with such substances as lime and magnesia. Phosphates are abundant in the crust of the earth, where they occur as phosphate rock. They also occur in the remains of animals, as bone ash, and in the remains of plants, as vegetable mold. Phosphate of lime forms about 57 per cent of the bones and from 80 to 90 per cent of the teeth of animals, and it appears in the other tissues and fluids. In agriculture the adequate supply of phosphates to plants is a necessity in all depleted soils. These phosphatic

fertilizers consist for the most part of bones, ground bones, mineral phosphates, bone-ash and guano.

PHOSPHORESCENCE, *fos fohr es' ens*. There are several substances, which, if placed in the dark after exposure to light, emit a pale luminosity. The property of thus emitting light is called phosphorescence. Barium sulphide and calcium are highly phosphorescent, and diamonds, after exposure to sunlight, glow for a time. The kind of light to which the phosphorescent body is subjected affects the quality of the light it afterward emits. For example, calcite after having been in sunlight gives an orange phosphorescence; argonite and uranium glass, green; sapphires and rubies, red. Certain minerals are phosphorescent for only a fraction of a second, and the property of phosphorescence is discovered in them only with the aid of delicate apparatus.

There are several animal organisms which exhibit phosphorescence of a quite different sort from that of minerals. Fireflies and glowworms emit a light which is not derived, but is self-generated. Certain fishes living in darkness in the profound depths of the ocean are brightly phosphorescent, and there are microscopic marine infusoria which float in millions on the surface of the water and at night, in the wake of a ship, seem to set the foam afire. Among plants some liverworts, algae and fungi are self-luminous, as well as some of the vegetable decaying matter seen in the woods. Phosphorus, a nonmetallic chemical element, phosphoresces, but its light is due to slow combustion and is altogether different from the other kinds.

PHOSPHORIC, *fos fohr'ik*, **ACID**, an acid containing phosphorus, hydrogen and oxygen, usually obtained by burning phosphoretted hydrogen in atmospheric air or oxygen. It is also produced by the oxidation of phosphorus acid, by oxidizing phosphorus with nitric acid, by the decomposition of apatite and other native phosphates and in various other ways. It is used in medicine in the form of a solution, or diluted acid, to relieve disordered conditions of the mucous membrane and to strengthen the system when disease has caused softening of the bones.

PHOSPHORUS, *fahs'fohr us*, a yellowish, waxlike substance that ignites at a very low temperature, and burns with a brilliant white flame, giving off a dense white vapor. When exposed to the air phosphorus is luminous in

the dark, and it is from this peculiarity that it receives its name, which comes from two Greek words meaning *light bearer*. Common phosphorus, when pure, is almost transparent and colorless. At common temperature it is a soft solid, easily cut with a knife, and the cut surface has a waxy luster. It melts at about 108° and is exceedingly inflammable. Exposed to the air at common temperatures, it undergoes slow combustion, emits a white vapor of a peculiar odor, appears luminous in the dark and is gradually consumed. On this account phosphorus should always be kept under water when it is desirable to preserve it. A very slight degree of heat is sufficient to inflame phosphorus in the open air. Gentle pressure between the fingers, friction, or a temperature not much above its point of fusion, kindles it readily. Phosphorus is very poisonous. Burns from it are difficult to heal, and a small quantity taken into the system causes death. It should not be handled except under water.

Phosphorus was formerly extensively used in the manufacture of matches, but its use is now forbidden by law in most countries because of the disease known as *phossy jaw*, caused by it. Its compounds known as *phosphates* are used in medicine, and phosphate rock is extensively used as a fertilizer, since phosphorus is an important plant food. It is also an important animal food, and is found in bones and in the brain and nerves in larger proportions than in other tissues.

PHOTO-ENGRAVING, a process of engraving, by which the picture is first transferred to the block or plate by means of photography. The result is a printed surface, corresponding to the original from which the photographic image was taken. For a description of the different phases of the process, see **ELECTROTYPEING**; **HALFTONE**; **LITHOGRAPHY**, subhead *Photolithography*; **PHOTOGRAVURE**; **ZINC ETCHING**.

PHOTOGRAPHIC SURVEYING, a form of surveying which originated with the French and adopted to a limited extent in America, particularly in the prairie provinces of Canada. The camera is provided with cross wires and a leveling apparatus. In surveying, two stations (or more) on the area are selected, and the base line between them is measured. Thousands of square miles of territory, hitherto almost inaccessible, are now being accurately mapped by this method, with greatly improved cameras.



PHOTOGRAPHY, *fo to'gra-fi*, literally the art of writing or drawing by light. Photography has become so common that we seldom pause to consider it as one of the most practical and most widely used of the fine arts throughout the world. There is scarcely a field of endeavor in which it is not found. While it is most extensively employed in making portraits and reproducing natural scenery, photography is of great

value in the realm of science. The camera, combined with the telescope, enables the astronomer to photograph the heavenly bodies, and to make complete charts of the heavens. By attaching a microscope to the camera, the structure and movements of insects can be pictured and the minute structure of many vegetable and animal organisms revealed.

Processes. Photography consists of three processes—the exposure of a sensitized plate or film, or taking the picture, developing the exposed plate or film, or making the negative, printing from the negative, or making the positive. These processes are known as *exposure, developing and printing*.

Exposure. The plate consists of glass or celluloid film, having one side covered with gelatin, containing a composition of silver bromide, which is very sensitive to the action of light. The preparation of plates is an industry by itself, and the photographer obtains them already prepared. Most plates are so sensitive that perfect pictures can be obtained by instantaneous exposure. These sensitive films make moving pictures possible.

To obtain a good negative, the photographer must use care in making his exposure. The focus of the camera should be carefully adjusted, the instrument should be so placed that the light will fall upon the object, and never upon the lens. The light upon the object should be such as to avoid sharp contrasts of light and shade, and the exposure should be timed according to the intensity of the light. The determination of the time is learned only by experience, amateurs usually over-expose their plates. Views obtained by *snapshots* and *flash light* are results

of instantaneous exposures While very good negatives may be obtained in this way, they usually lack the detail of time exposures The exposed plate does not show any trace of the picture

Developing The second step consists in developing the negative This is done in the *dark room*, which is lighted by a small window containing a pane of red glass or by a lamp shielded by a red- or orange-colored globe, because these rays will not produce any effect upon the negative.

The plate is laid in a shallow tray, face-side up, and the prepared liquid, called the *developer*, is poured upon it, after which the tray should be gently rocked to secure an even action of the developer upon all parts of the plate In developing, the strongest lights and shades appear first, being followed by the more minute details When these are all visible, the process should be stopped This is done by removing the plate, washing in cold water and then placing in a bath of hyposulphite of soda, which dissolves the sensitive portion of the film not acted upon by the light If the exposure and developing have been properly done, this last process should leave a clear, sharp negative When taken from the hyposulphite bath, the negative should be thoroughly washed and then dried before being used for printing Tanks containing the prepared fluid are now in use by many amateurs They take the film direct from the camera and turn out the negative without the necessity of the dark room

Printing The picture developed on the plate is called the *negative*, because its lights and shadows are reversed, and in order to obtain a picture which resembles the object, a *positive* must be obtained This is printed on prepared paper, the negative being placed face-side up in a frame, and the paper laid upon it and exposed to the light for a short time After printing, the positive is *fixed*, by being soaked in a solution of hyposulphite of soda It is then *toned*; that is, it is given its proper color by a solution of gold After toning, the photograph should be thoroughly washed, to remove all traces of chemicals not solidified in the printing, otherwise the picture will fade and discolor Many preparations for amateur work contain both the fixing and toning chemicals in the same solution, and devices for developing are in use which produce the finished negative by running the film through a specially prepared tank, con-

taining the developer and so constructed that a dark room is not required The great variety of effects seen is caused by the different methods of preparing the printing paper and the different ingredients used in toning solutions

Color Photography. Photographing objects in their natural colors has been brought to a high degree of perfection The process is more complex than that in ordinary photography The sensitized plate is prepared by covering one surface of the glass with starch granules, alternately red, green and blue A preparation sensitized to all the colors of the rainbow is then poured over these granules The plate is placed in the camera with the glass surface towards the lens so that the light will pass through the colored starch granules before reaching the sensitized film The exposed plate is developed into a positive which is a picture of the object in its natural colors First-class three-color and four-color prints can be made from these positives, but no process of making prints from them has yet been perfected

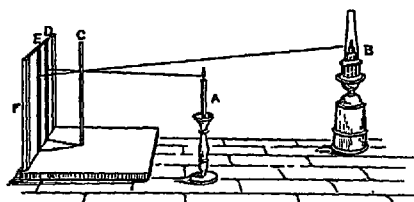
History. The present degree of perfection in photography has been reached after years of study and invention The first step in this art was the discovery, in 1809, by Thomas Wedgwood, of a way of making crude profiles by the action of light upon paper or cloth that had been soaked in a solution of nitrate of silver Thirty years later Daguerre laid the foundation of photography by means of the process which bears his name It consists of printing the picture on sensitized glass The use of sensitized paper was introduced by a Frenchman named Niepes, and about 1851 the present process of photography was established by an Englishman named Archer, who began the use of the negative as we now know it From this discovery the various steps in the progress of the art have been in perfecting the sensitized plates and paper and in improving the camera

Related Articles	Consult the following
titles for additional information	
Camera	Half-tone
Daguerreotype	Lithography
Electrotyping	Photogravure

PHOTOGRAVURE, a process of engraving which combines photography and etching A positive photograph of the picture to be reproduced is made on glass This is placed in a reverse position on a plate covered with a bituminous

is then exposed to light. The portions of the varnish acted upon by the light are rendered insoluble, while those protected by the shadows remain unchanged. After exposure, the varnish is dissolved from the lines and the plate is etched. After etching it is "re-touched" and improved with the graver. By the photogravure process the finest possible results are obtained, and it is extensively used for the production of large pictures, which rival the finest steel engraving in their delicacy and finish. It is also employed in the reproduction of photographs and smaller pictures for books and periodicals. For this class of pictures a less expensive process of preparing the plate is used, and plates of this grade are often prepared for use on rotary presses. See ETCHING, PHOTOGRAPHY.

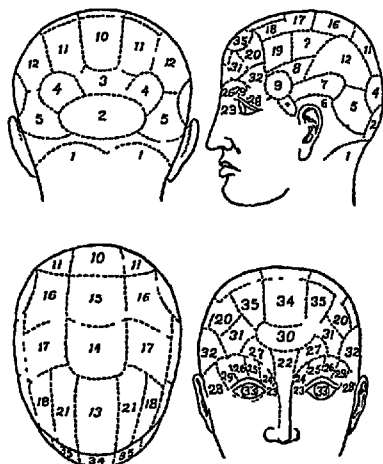
PHOTOMETRY from the Greek *phos*, meaning light, and *metron*, meaning measure, is the art of measuring the intensity of a source of light, by comparison with a standard of reference. Instruments called *photometers* have been devised for applying many different methods of measurement to each part of the spectrum of the light from each source. The degree of sensitiveness of the eye of the observer or a difference of sensitiveness between his two eyes affects the result. In other instruments used as photometers, what is measured is not the intensity of light, but the radiation of light. The relative intensity of light from stars is usually determined by a polarizing apparatus, which



brings the brightness of the star above that of the standard of comparison. One method of measurement is shown in the figure. The rod *C* is so placed that the shadows *E* and *D*, which fall upon the screen *F*, are of the same degree of intensity. The relative intensity of the lights is determined by their respective distances from the screen.

PHRENOLOGY, *fre no'lo ji*, a psychological theory based upon the belief that the brain is the organ of the mind and that it is a complex structure, composed of a number of

different organs, at first estimated to be thirty-four and later forty-two in number. It was supposed that each of these organs was the seat of a mental power or a sentiment, that the prominences in the skull indicated the location and size of the different organs and that any organ would increase in size and efficiency by the use of the power



PHRENOLOGY'S CHART OF THE HEAD

AFFECTIVE

- | | |
|---------------------------------------|------------------------|
| I—PROPENSITIES | II—SENTIMENTS |
| 1 Amativeness | 10 Self-esteem |
| 2 Philoprogenitiveness | 11 Love of Approbation |
| 3 Inhabitiveness or Concentrativeness | 12 Cautiousness |
| 4 Adhesiveness | 13 Benevolence |
| 5 Combaticiveness | 14 Veneration |
| 6 Destructiveness and Alimentiveness | 15 Firmness |
| 7 Secretiveness | 16 Conscientiousness |
| 8 Acquisitiveness | 17 Hope |
| 9 Constructiveness | 18 Wonder |
| | 19 Ideality |
| | 20 Wit |
| | 21 Imitation |

INTELLECTUAL

- | | |
|------------------|----------------|
| I—PERCEPTIVE | 29 Order |
| 22 Individuality | 30 Eventuality |
| 23 Form | 31 Time |
| 24 Size | 32 Tune |
| 25 Weight | 33 Language |
| 26 Coloring | II—REFLECTIVE |
| 27 Locality | 34 Comparison |
| 28 Number | 35 Causality |

of which it was the seat. From this theory was developed a system of determining a person's aptitudes and characteristics by a process of examining the head. Charts showing the location of the different organs of the brain and marked with the mental power which each organ represented were used, and the relative value of these organs was marked upon the chart when the person's head was examined.

Phrenology originated with F J Gall, a Viennese physician, early in the nineteenth century, and it was introduced into the United States in 1830, where it soon gained a large number of adherents. Lecturers went about the country giving popular lectures on the subject, examining heads and giving charts for which fees were charged.

With scarcely an exception physicians rejected phrenology, because they considered that the fundamental belief was based upon erroneous ideas concerning the brain, and later investigations have proved that their assumption was correct. While it is now well known that the certain centers in the brain preside over certain functions of the body, it is equally well known that a man's character is not determined by the "bumps" on his head. Phrenology, a so-called science, is merely a theory without any scientific or reasonable foundation.

PHRYGIA, *frý'ē a*, in ancient times, a country in Asia Minor which varied in extent and boundary in different periods of its history. Loosely speaking, it may be identified with the central plateau of the peninsula. From Thrace wandering tribes entered the region, made themselves masters of it and settled down into a rustic, peaceable people, engaged in farming and stock raising. After a long period of independence they were overcome, in the seventh century B C, by the Cimmerians and thenceforth lost their identity as a political unit, falling successively under the rule of Lydia, Persia, Macedon, Pergamum and Rome. In legend Gordius and Midas were kings of Phrygia. See **GORDIAN KNOT**.

PHYLLOXERA, *fil lōks'ur a*, a plant louse that does great damage in vineyards. It is a native of North America, having subsisted for ages, perhaps, on wild grape vines before it became known in grape culture. The pest was discovered in England in 1863, and about the same time it appeared in France, having been carried to those countries on exported American vines. It soon spread to nearly all the grape-growing regions of Europe, causing severe losses. The lice attack either the leaves or the roots of the plants. The roots when invaded become enlarged, then rot, the leaves turn yellow and the plant dies. Vine growers have checked the ravages of phylloxera by inundating their vineyards and saturating the soil about the roots of the vines with carbon bisulphide.

PHYSICAL, *fiz' i k'l*, **GEOGRAPHY**, that division of geography which deals with the natural features of the earth and the changes that are constantly taking place or have taken place on it. It treats of the natural divisions of land and water, such as continents, hills, rivers, seas and oceans. It is concerned with the external form, extent and location of mountains and valleys and of the outline and characteristics of coasts, also, with the relation and peculiarities of different portions of the earth's surface covered by water, including currents, wave action, depth of the sea, salt and fresh water lakes and the drainage of continents and countries. It treats of the atmosphere, especially in its relation to climate, and it discusses winds, storms, rainfall and general meteorology. It also treats of life upon the globe, especially of the distribution of plants and animals and their relation to their environment, tracing the influence of climate, soil, natural barriers or channels of communication upon the growth and spread of plants and animals, and especially upon the location and development of the various races of men. It does not, however, deal with political divisions, or study plant and animal life from the standpoint of botany and zoology. At the same time, physiography is very closely associated with all other branches of natural science.

The agencies which are still producing changes upon the earth's surface are the atmosphere, water and heat. The atmosphere causes changes through winds and rainfall. By these, hard portions of rock are disintegrated and loose portions are carried from higher to lower levels. Water is by far the most powerful agent in producing changes upon the earth's surface. It causes these changes through erosion, freezing and thawing, all of which disintegrate the rocks and aid chemical action, and by the operation of waves and tides. Heat, which is the great internal force of the earth, causes changes by producing changes of temperature and by volcanic action. In volcanic regions the surface is frequently changed by eruptions.

Related Articles The articles listed below suggest the wide scope of the subject. Attention is also directed to the topics listed at the close of the article **Geology**.

Aeolian Line	Calms Region	Coastal Plain
Arid Region	of	Cold Wave
Atmosphere	Canyon	Coral
Atoll	Cataract	Cyclone
Avalanche	Cave	Delta
Basin	Climate	Desert
Blizzard	Cloud	Dew
Butte	Cloud-burst	Divide

Doldrums	Island	Quicksand
Earth Currents	Isobars	Rain
Earthquake	Isothermals	Rainbow
Erosion	Kuro Siwo	River
Florida	Lake	Snow
Flood	Lava	Snow Line
Flood Plain	Lightning	Spring
Fog	Llanos	Steppes
Fountain	Maelstrom	Storms
Freezing	Marsh	Temperature
Frost	Mesa	Thermal
Geography	Mirage	Springs
Geyser	Mountain	Tides
Glaciers	Muir Glacier	Tornado
Gulf Stream	Oasis	Tundra
Hail	Ocean	Valley
Haze	Ocean Currents	Volcano
Hemisphere	Pampas	Waves
Hill	Piedmont	Wind
Horse Latitudes	Region	Waterspout
Humidity	Plain	Whirlpool
Hurricane	Plateau	Zone
Icebergs	Prairie	

PHYSICAL CULTURE, a term applied to the upbuilding of the human body by means of proper exercise and careful attention to the laws of hygiene.

Health Not a Matter of Luck Many people still hold to the belief that health is a matter of good or ill luck; that illness comes to us as the result of divine displeasure or indifference. Probably they do not know that there are definite laws of health, just as there are laws of business or government. Perhaps they think there are too many complicated influences such as heredity, environment, accident, temperament, germs and other intangible forces for good or ill for them to reckon with. Others say, "Oh, I'll leave those matters to the family physician. If the children get ill it is time to send for the physician." We quite agree that a skilful physician is one's best friend in time of sickness. The physician and surgeon have a very important mission in the world, and it is one of the noblest attributes of a noble profession that it is concerning itself as much with the prevention as with the cure of disease. This is the accepted modern theory of medical practice.

Action Necessary But why wait till illness actually comes before concerning yourself with the question of health? Why not build up and fortify your system and the systems of your children against the attack of germs? Why not attain such degree of vitality and power of resistance to disease that you no longer live in terror of drafts, wet feet and contagion? Why not give the children of the land such a degree of vigor that they will go through life enjoying every minute of existence and be able to overcome cheerfully obstacles and discouragements which crush others not so well prepared?

A Lesson from the Greeks. The ancient Greeks, in this respect, were far ahead of us to-day with all our boasted civilization. The care of the body was then of equal importance with the cultivation of the mind, and through systematic habits of exercise and diet, the Greeks attained a perfection of mind and body, a harmonious adjustment of the mental and physical that made them the wonder and admiration of the pagan world. The Greek tutors and parents understood better than we of this enlightened age the necessity of giving the mind a healthy, vigorous body from which to derive its power, and the almost universal success they achieved in bodily training shows how well they understood the principles on which such training should be based.

Weakness and Disease Result from Cause It is to be regretted that a large proportion of the ills of humanity are due to ignorance of the laws of health. Thousands of school children struggle for an education under serious disadvantages of physical weakness, if not of actual disease, when the trouble lies wholly in the mode of living adopted or permitted by the parents. This condition is simply the result of the law of cause and effect, a law which is never suppressed in nature. If children are weak, nervous, anemic, irritable, stupid or inattentive, there is a reason for it, and the parent should trace back this reason from effect to cause. The suggestions on the following pages are designed to assist not only parents but all others to apply the health principles in a practical way.

Many parents say that their children are not ill, that they are well and strong. Then it is the duty of such parents to keep their children in this condition. However, we should bear in mind that their vigor may be more apparent than real. Big biceps and a bigger appetite do not always indicate vital power. Muscular development secured at the expense of the nervous system is a menace rather than a safeguard. *Keep ever in mind that endurance and resistance to disease are things to be desired.*

What Power of Endurance Indicates A boy or man may have a fine physique, he may be able to lift great weights, and yet be vulnerable to disease germs. The test lies in endurance. Endurance means the power to sustain work for a great length of time without undue fatigue or exhaustion. *Fatigue comes*

from the accumulation of body wastes High power of endurance indicates that the body is comparatively free from these wastes or poisons

Endurance has been one of the secrets of success of the world's great men, such as Washington, Napoleon, Gladstone and Theodore Roosevelt. The latter's achievements are so recent as to be easily recalled. Yet this man of iron will and almost unlimited endurance was at one time in poor health and obliged to remove to the plains and live for a while in the open air. However, while in certain cases a change of climate or scene is beneficial, you can begin, right in your own home, the work of health-building, and in nearly all cases carry it to a successful issue

Exercise. The value of exercise as a health-building agent is coming to be generally recognized That pronounced physiological effects may be produced and morbid conditions relieved by exercise is universally admitted However, we must remember that exercise may be made harmful as well as beneficial Sometimes the prescribing of exercise in proper kinds and amounts calls for the most exacting and mature judgment It is not uncommon to hear people say that exercise does not agree with them Doubtless the fault is not in the exercise itself, but in the way in which it is applied

Authorities agree that an imposing muscular system is not a sure indication of health Health depends on perfect functional activity, that is, harmonious action of the vital organs, such as the stomach, the heart, the kidneys, the liver and the lungs These organs are all encased in the trunk of the body It may be said that it is in the trunk that the individual lives This is the human power house The limbs may be amputated and yet the vital organs will go on doing their work as before, and the individual may enjoy good health But once impair the efficiency of any of these vital organs, and you have a condition of ill health to a greater or a lesser degree

The Aim of Modern Physical Culture It is therefore to the trunk of the body with its vital contents that modern physical culture experts direct their attention The more perfectly the vital organs coordinate, the higher the individual's vitality It has been found that there is a close sympathy between the exterior muscles of the trunk and the internal organs, and that by strengthening these muscles it is possible to invigorate the underlying

organs It is therefore of the greatest importance that the abdominal muscles be developed and that the exterior muscles over the heart and lungs be strengthened through suitable exercise This, in brief, is the aim of physical culture to-day, and the exercises shown on the following pages are planned systematically to build up and strengthen the muscles of the trunk

The exercises prescribed can be taken in your own home, without any expenditure for special clothing or apparatus It is important that the exercises be taken in a well-ventilated room, and that sufficient loose clothing be worn to protect the system from cold To the beginner a caution is necessary One unaccustomed to these exercises is very liable to indulge too freely at the start When this happens, muscular soreness and lameness follow It is far better to do too little than too much, and the exercise should be continued only long enough to produce mild fatigue, *never to the point of exhaustion* The amount of exercise should be increased gradually as the strength improves While the most desirable hours for these exercises are just before retiring at night, or when one rises in the morning, they may be taken at any time if other hours are more convenient

It is not supposed that one will attempt all of the following exercises at the beginning Only one or, at the outside, two should be practiced at first After this, one exercise after another can be added as the strength increases and the system is invigorated Doubtless but few will care to practice all of the exercises given Neither is it necessary that they be taken in the order in which they are named, some may prefer to select certain numbers, others another series of numbers The chief point is that a certain amount of exercise be taken with regularity and that the exercises adopted be such as to bring all the muscles of the trunk into activity

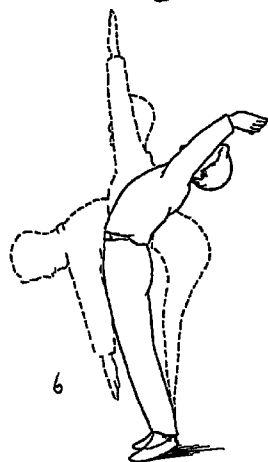
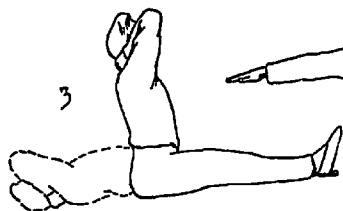
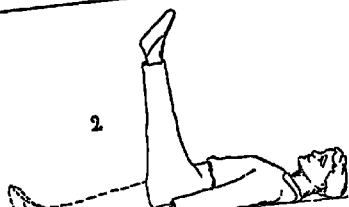
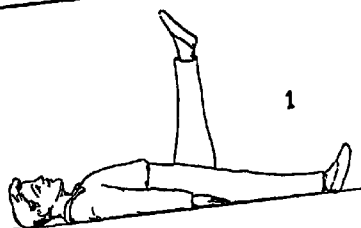
Exercises for Practice The positions of the body in the following exercises are explained below

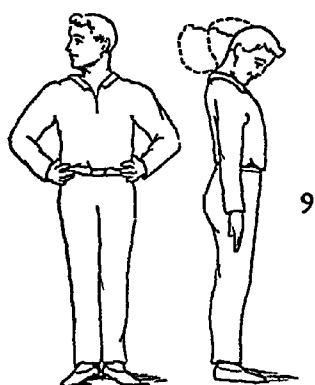
Exercise 1 Lie flat on the back Raise first one leg and then the other to a perpendicular position (See next page, Figs 1 and 2)

Exercise 2 Raise and lower both legs Continue until mildly tired This is an excellent exercise for the abdominal muscles

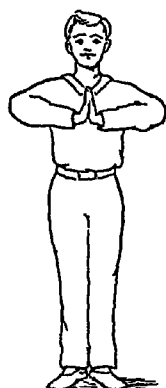
Exercise 3 Same position as in Exercise 1 Hands clasped behind the head Pull up to sitting position (See Fig 3)

Exercise 4 Stand erect, arms outstretched to the side horizontally Twist to left as far

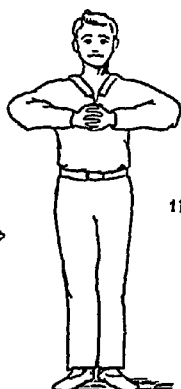




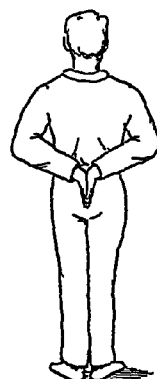
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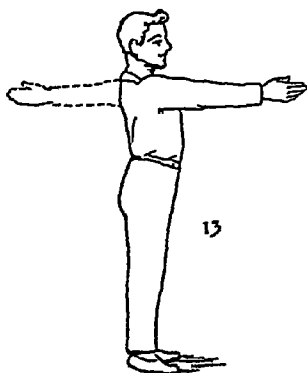
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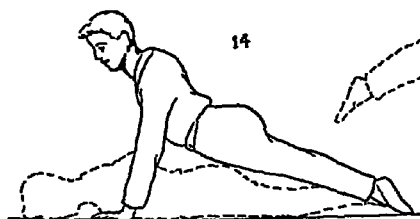
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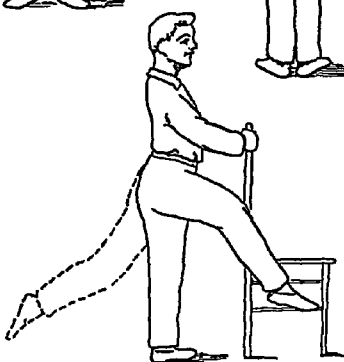
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as possible, then twist to the right. (See Fig 4)

Exercise 5 Hands on hips Bend first to right as far as possible Then repeat to the left. (See Fig 5)

Exercise 6 Stretch hands overhead Bend back as far as possible, repeating until tired Alternate by bending forward and trying to touch toes (See Fig 6)

Exercise 7 Hands on hips Twist the trunk around in a circle, first one way, then the other (See Fig 7)

Exercise 8 Hands on hips Lower the trunk to a squatting position and raise to standing (See Fig 8)

Exercise 9 Tense the muscles of the neck and turn head from side to side, making one set of muscles resist the other in the movement In the same manner turn the head forward and back and around in a circle, first to the left, then to the right This is to develop and strengthen the neck A large neck indicates power It insures a good blood supply to the brain (See Fig 9)

Exercise 10 Place the palms of the hands together in front of the breast and press hard (See Fig 10)

Exercise 11 Lock the fingers together in front of the chest and pull one hand against the other. (See Fig 11)

Exercise 12 Lock the hands behind the back and alternately pull one against the other and push them together (See Fig 12)

Exercise 13 Arms outstretched horizontally Make the hands describe a full circle forward and back (See Fig 13)

Exercise 14 Place the hands on the floor, the body outstretched, face downward Raise and lower the body from the floor, dipping the body until the nose touches the floor (See Fig 14)

Exercise 15 Hands on back of a chair or table Raise and lower the knees rapidly, as in running (See Fig 15)

Caution It is not intended that all these exercises be taken at any one time Selections may be made from them according to taste If the doing of these exercises becomes drudgery to the child, stop a while, but resume them again as soon as possible Let there be one day in the week of absolute rest

Wise Selection of Food. Food is closely related to health The quantity and quality of food should be suited to the needs of the individual This means that it depends very largely upon age, climatic conditions and occupation In general, one engaged in an occupation which calls for vigorous and prolonged muscular exercise in the open air requires a larger quantity of food and more stimulating food than one engaged in sedentary occupations There are, however, exceptions to this general rule These exceptions are very apparent among certain classes of people who take directly opposite views in regard to the value of meat as an article of

food Those known as vegetarians exclude meat from their diet entirely, while we find others who subsist almost wholly upon meats However, the great majority make use of a mixed diet, in which vegetable foods and meats are mingled in varying proportions

In the last analysis, the quantity and nature of food depend upon the individual Neither medical science nor the systematic study of disease have yet been able to disprove the truth of the old adage, "What is one man's meat is another man's poison" In other words, those articles of food which seem to be perfectly adapted to one individual, and by that person easily digested, are to another almost entirely indigestible and cannot be eaten without injury

Food should be nutritious, readily digestible and free from an excess of condiments or other substances which highly seasoned food contains For all such substances as need cooking, thorough cooking should be done In winter one needs more food than in summer, and usually one eats more meat and more fats in winter than in summer because of the heat-producing quality of these substances

Few Know How to Eat Properly. More attention should be given to the manner of eating than is bestowed upon it by a large number of people. All vegetable substances contain more or less starch, and unless starch is digested, it furnishes no nutriment One should remember that the digestive process of starches begins in the month by the munging of saliva with the food. Therefore, food should be thoroughly masticated One should eat slowly and chew the food until the saliva is thoroughly mingled with it By doing thus the food becomes more thoroughly digestible, furnishes a larger proportion of nutriment, and consequently a less quantity supplies the needs of the system Those who eat rapidly invariably eat too much and overwork the digestive organs. This practice in the course of time cannot fail to lead to the weakening of these organs and consequent ill health.

Food should be taken at regular intervals The digestive organs are rhythmic in their action, and when they become accustomed to act at certain intervals, they perform their duties more satisfactorily if this custom is followed The average adult eats three meals in twenty-four hours; some believe in eating but two. However, if other conditions are equal, the person eating two meals a day

will take and assimilate as much food as the one eating three: the first simply eats more at a time. Young children need to eat more frequently than adults, and this need should always be met. However, it should not degenerate into a habit of constantly eating between meals, after the children have reached such an age that there is no necessity for their eating more frequently than adults. Another very injurious habit which children are sometimes allowed to form is that constantly munching. This always keeps undigested food in the stomach, and tends to overwork that organ and consequently to irritate it.

Pure Air a Necessity. Pure air is as essential as pure food. One can live for hours and even days without food and drink, but one cannot live five minutes without breathing.

We pay too little attention to proper ventilation. Defective ventilation is one of the most prolific sources of tuberculosis and other lung troubles. The home, and especially the sleeping rooms in the home, should be thoroughly ventilated. People are recognizing the importance of pure air, and in most modern dwellings good systems of ventilation are provided. However, in many of the older houses these are either defective or wholly wanting. In such cases, care should be taken to let in air from the outside at frequent intervals. One should remember that cold air is not necessarily pure air, and a room whose temperature is below freezing may, from this point of view, need ventilation as much as one which has a temperature of 70°, or even more. Schoolrooms and all other public buildings should be thoroughly ventilated every time they are vacated.

Breathing Exercises Breathing exercises in the open air, except in cold weather, are very beneficial and strengthening. In taking these exercises one should stand erect with hands on hips and head thrown back a little. Air should be inhaled slowly until the lungs are filled to the utmost capacity, then the air should be expelled from the lungs as completely as possible. Exhalation may be slow or rapid, or the slow and rapid movements may alternate. The same effect is secured by practicing these exercises in a room with windows open so as to give as full a circulation of air as is obtained out of doors. Air should be inhaled through the nostrils.

In the beginning breathing exercises, like muscular exercises, should be taken lightly,

for they can cause more or less of a strain upon the system. As one becomes accustomed to them, they can be increased in length and vigor. But if indulged in too freely at first, and not begun gradually, they are liable to result in injury.

Related Articles Consult the following titles for additional information
 Athletics Food Gymnastics
 Breathing Games and Hygiene
 Plays

PHYSICAL GEOGRAPHY See page 2829

PHYSICS, *fiz'iks*, from a Greek word meaning *nature*, is that study which deals with matter and energy. It was once called *natural philosophy*, but the shorter term *physics* is now universally employed, it more clearly defines the subject, for it teaches of physical properties of matter. If changes occur in a substance which alter its very nature, that change is in the realm of chemistry, for it is a chemical change, if a change does not alter the character of a substance it is a physical change. For example, if water is boiled and changed to steam and vapor, each part is yet water, and upon cooling and condensing it again becomes water, for no alteration of its elements has occurred, such phenomena are studied in physics. However, if a particle of water is separated into its elements, neither of the two elements into which it can thus be separated is water. This is a chemical change, and belongs to the science of chemistry.

Matter is defined as anything that occupies space and has weight, whether or not it can be seen. Thus, physics proves that air is matter, we know it occupies space, and through the application of physical laws we know with what weight it presses evenly in all directions upon everything on the earth. Physics is divided into numerous branches, it includes mechanics, or the general principles involved in the construction of machines—and a machine may be any device from the boy's slingshot or a jewsharp to the mighty locomotive or airship, it treats also of heat, light, sound, gravitation, magnetism, and electricity, and of all the phenomena connected with each of them. Thus it touches the daily life of each person in almost numberless ways. It is an absorbing subject, and ever changing, though without alteration in its basic principles, its scope is constantly widening as scientists explore further into the mysteries of the physical world.

Wonder Questions in Physics

If you throw a ball into the air how do you know that it will come down again?

Any object thrown into the air falls back again because it is pulled to earth by the force of gravity. Since the direction in which this force acts at any point is nearly toward the earth's center, any falling body will drop vertically. If it were not for the force of gravity a ball thrown into the air would go flying off into space and never come back again.

Do all falling bodies fall with the same rate of speed?

Heavy bodies seem to fall faster than light ones, but that is because in their descent they are less impeded by the air than light ones. If we should exhaust the air from a closed tube, place a coin and a feather in one end and then invert the tube, we would see the coin and the feather fall side by side until they reached the bottom. All freely-falling bodies have the same rate of motion in a vacuum. But when a feather and a coin are dropped in air the coin reaches the ground first because it can push against the air more effectively than can the feather.

Why is a person standing in a street car apparently thrown forward when the car stops suddenly?

This familiar action is the result of the law of inertia. Inertia is the property which causes any body to resist any attempt to start it when it is at rest, or to change the direction or amount of motion when it is moving. A person standing in a moving street car continues to move forward even though the car stops, because inertia makes him do so. That is why he is liable to lose his balance when there is a sudden stop. Also, if the car is at rest and starts forward suddenly, the standing passenger seems to be thrown backward. The reason for this is that inertia makes him tend to stay where he is, while the car moves forward under him. To keep his balance he must push backward with his feet. Again, when the car goes around a curve it changes its direction, of motion, while the standing passenger tends to keep the original direction. Therefore he seems to be thrown sideways against the car.

Why does rubbing the hands together make them warmer?

Rubbing any two substances together results in friction, and friction produces heat. Drivers who rub their hands briskly

against their clothing in cold weather are applying the principle of friction, though they may not recognize it as a law of physics. Examples of the production of heat through friction are numerous. Before matches were invented people started fires by rubbing hard pieces of wood together, or flint and steel. Car-wheel axles sometimes get so heated through friction that the cars are set on fire. Friction is defined as the resistance that must be overcome in moving one surface over another.

Is a perpetual motion machine a possibility?

No one will ever be able to make such a machine until he disproves the law of conservation of energy. By this law we mean that when energy is converted from one form into another there is neither gain nor loss of energy, energy cannot be created or destroyed. So long as this law holds good no machine will ever be invented that will run continuously without the help of some external force. While a machine is in motion there is friction to overcome, and energy must be used to overcome this friction. Unless some outside force is applied there will be a gradual decrease of energy in the machine, and it will finally cease to operate.

Of what is steam made?

Steam is the gaseous form of water. It is colorless and invisible, though we often speak of seeing steam coming out of the spout of a tea kettle. What we actually see is the steam changed back into small particles of liquid by the cooler temperature of the air. The visible cloud really begins an inch or so from the spout. Everyone has noticed that when water is boiling there are small bubbles on the surface. These are bubbles of steam, which have formed at the bottom of the heated water and floated up to the top.

Why can you not see around a corner?

Objects become visible to us when they send back to the eye light received from some luminous body. Light waves travel in straight lines when passing through a medium of uniform density, and because the waves cannot turn around corners we cannot see the objects around those corners. For the same reason a shadow is formed on a wall by a screen placed between a lamp and the wall. As the light waves from the lamp strike the screen, some are reflected back to the eye.

and the rest are absorbed. None of the light, however, can pass around the screen, and thus the space on the wall behind it is in the dark.

Why does the straw in one's lemonade look bent at the surface of the liquid?

Though light travels in a straight line through a medium of uniform density, a ray of light will bend when it passes from one medium to another of different density. This is what happens when a ray passes from air to the denser lemonade. As your eye follows the straw in your glass you see that it seems to be bent where it enters the liquid. The ray which the straw sends back to your eye is actually bent at this point, and so the straw seems to have the same bend. Such bending of a light ray is called refraction. What other examples have you noticed?

If a distant star within our range of vision should suddenly grow dark would it become invisible at once?

No, because the light from the stars does not reach the eye instantaneously, though it seems to. Light travels at the rate of about 186,000 miles a second. Now this rate is practically instantaneous for objects on earth, but it is a different matter in the immeasurable depths of space. It takes eight minutes for the sun's rays to strike the earth, and the rays from the nearest star travel for four years and five months before they reach us. The rays which show us the north star started on their journey about forty-four years ago, and we are seeing rays now from stars which ceased to exist thousands of years ago.

Why cannot eggs be boiled on top of a mountain?

Increasing the pressure on the surface of water raises the boiling point, and diminishing the pressure lowers the boiling point. That is, the temperature of water which boils at sea level is much higher than that which boils on a mountain because the air at sea level is much denser than that higher up. On top of a mountain the pressure of the air is so low that though the water may boil it does not become hot enough to cook the eggs.

Why do the contents of a thermos bottle remain hot or cold?

The thermos bottle is constructed on the principle that heat may be conducted from one place to another. Such a bottle consists of a double glass container enclosed in a metal case. The inner glass vessel is fused to the outer one after the air between them has been exhausted. The space between the two vessels is practically a

vacuum, and a vacuum will not conduct heat. Therefore a hot liquid poured into the inner vessel remains hot because its heat cannot escape across the vacuum, and a cold liquid remains cold because outside heat cannot reach it. The principle of conduction is also applied in the construction of a fireless cooker, the space between two boxes is packed with excelsior or other substance through which heat cannot flow, and the hot food in the inner box retains its heat indefinitely.

Why does not the car on a loop-the-loop railway fall off the track when it is inverted at the top of the loop?

Such a car clings to the rails because of centrifugal force. Centrifugal force is a pull from the center of rotation, and it is the result of the tendency of every object to move in a straight line. A body rapidly rotated resists the force that makes it move in a curved path, and seems to be pulling away from the center about which it is turning. This pulling from the center is what keeps the water in a pail from falling out, even when the pail is whirled around upside down. We see an example of centrifugal force in the mud that flies off the wheels of a swiftly-moving vehicle running on a muddy street.

Why do glass or earthen pitchers containing water sometimes burst when the water freezes?

Though water contracts when cooled, this contraction ceases just before the freezing point is reached, or at about 39 degrees Fahr. When cooled further the water expands to the freezing point, and when it freezes it expands still further. Therefore breakable pitchers sometimes crack and fall apart because of the expansive force of the freezing water. This power of expansion is also shown in the breaking up of rocks when water contained in their crevices freezes. The bursting of water pipes in cold weather is likewise a familiar illustration of the expansive force of freezing water.

Why does one's hand feel cold when it is dried in the air after being wet with gasoline?

This is due to the fact that gasoline evaporates very rapidly. Evaporation is the process by which moisture is taken into the air in the form of vapor. Heat is always absorbed during evaporation, but when the hand is wet with water the process is much slower than in the case of gasoline. Accordingly, one does not get so great a sensation of coolness when the drying hand has been dipped in water as when it has been placed in gasoline.

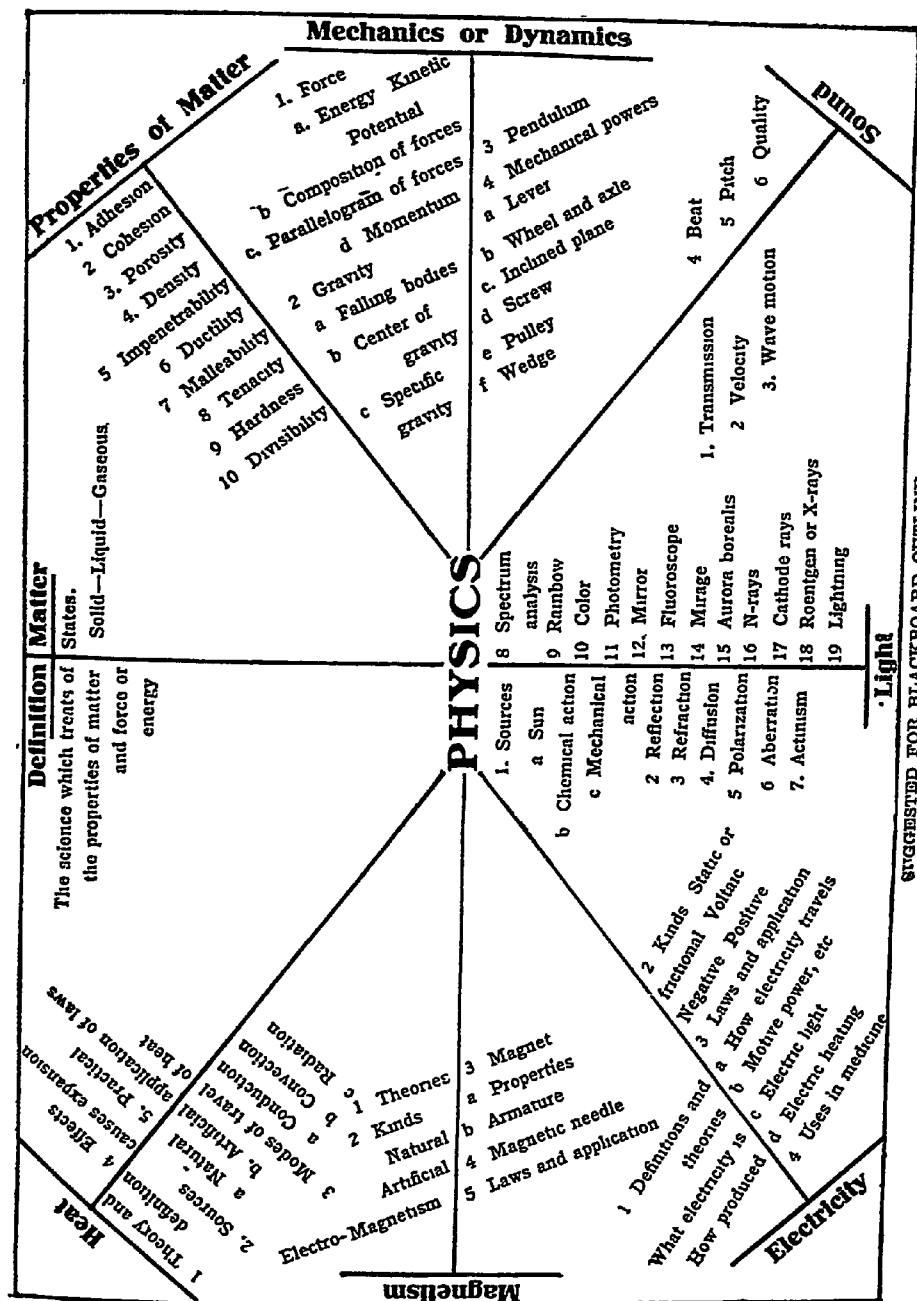
Outline on Physics

- I. INTRODUCTION
- II. PROPERTIES OF MATTER
 - (1) Occupies space
 - (2) Special properties
- III. MECHANICS OF SOLIDS
 - (1) Energy
 - (2) Motion and velocity
 - (3) Gravity and laws of falling bodies
 - (4) Curvilinear motion
 - (5) Work
 - (6) Machines
- IV. MECHANICS OF FLUIDS
 - (1) Characteristic phenomena
 - (2) Laws of pressure in fluids
 - (3) Density and specific gravity
 - (4) Pressure of the atmosphere
 - (5) Machines depending on air pressure
- V. SOUND
 - (1) Wave motion
 - (2) Transmission and velocity
 - (3) Intensity and loudness
 - (4) Beats
 - (5) Pitch
 - (a) Of strings
 - (b) Of pipes
 - (6) Quality
 - (7) Harmony and discord
- VI. LIGHT
 - (1) Nature
 - (2) Reflection and refraction
 - (3) Lenses
 - (4) Color
 - (5) Optical instruments
- VII. HEAT
 - (1) Temperature
 - (2) A cause of expansion
 - (a) Solids
 - (b) Fluids
 - (3) Measurement of
 - (4) Change of state
 - (5) Transmission
 - (6) Heat and work
- VIII. MAGNETISM AND ELECTRICITY
 - (1) Magnetic action
 - (a) Nature
 - (b) Effect
 - (2) Electricity
 - (a) Electrification

- (1) By induction
- (2) By conductors
- (b) Current electricity
 - (1) Nature
 - (2) Effect
- (c) Electrical qualities
- (d) Machines

Questions on Physics

- What do you understand by physics?
- What is meant by properties of matter?
- Explain transparent, opaque, elastic
- What is meant by inertia?
- Define the two kinds of energy
- What are the two obvious effects of energy or force on matter?
- What is work?
- What is velocity? Acceleration?
- What is the simplest example of uniform acceleration?
- What is gravity?
- What is the law of universal gravitation?
- How far will an apple fall the first second? A ten-pound stone?
- Will a feather fall the same distance?
- Would it fall the same distance in a vacuum?
- Define vacuum
- What is center of gravity? Explain equilibrium
- Which learns to walk more easily, the biped or quadruped? Why?
- What makes it so difficult to walk on ice?
- What is friction? In what cases is it desirable to do away with it altogether? What means are used to accomplish this?
- What would happen if friction did not exist?
- Give practical examples of cohesion and adhesion
- What is the difference between a solid and a fluid?
- Name the two divisions of fluids? How are they distinguished?
- In what directions do fluids exert pressure?
- Is the pressure the same in all directions?



No person engaged in an ordinary occupation, no matter how much he is attracted to the subject, can hope to keep informed on all its phases. Even textbooks that are a year old are quite certain to be out of date in some respects.

Related Articles Consult the following titles for additional information

Adhesion	Lens
Boiling Point	Lever
Boyle's Law	Light
Calorie	Liquid
Capillarity	Liquid Air
Center of Gravity	Magnetism
Centrifugal Force	Malleability
Centripetal Force	Matter
Cohesion	Mechanical Powers
Composition of Forces	Mechanics
Compressed Air	Melting Point
Crookes Tubes	Momentum
Diffusion	N-Rays
Ductility	Parallelogram of Forces
Dynamics	Pendulum
Dynamo	Penumbra
Echo	Perpetual motion
Elasticity	Photometry
Electricity	Pneumatics
Energy	Polarization of Light
Evaporation	Porosity
Expansion	Pulses
Extension	Radio
Falling Bodies	Regulation
Flexibility	Röntgen Rays
Fluorescence	Siphon
Foot Pound	Solid
Force	Sound
Freezing	Spectrum Analysis
Friction	Spring
Geissler's Tubes	Steam
Gravitation	Telephone
Gravity, Specific	Temperature
Hardness	Tenacity
Heat	Thermometer
Horse Power	Vacuum
Hydraulics	Vapor
Hydrostatics	Velocity
Ice	Water Power
Inclined Plane	Weight
Inertia	

Archimedes	Physicists	Helmholtz, Hermann von
Bacon, Roger		Kelvin, Baron
Bunsen, R. W. D.		Michelson, Albert A.
Curie, Pierre and Marie		Morse, Samuel F. B.
Edison, Thomas A.		New ton, Isaac, Sir
Fahrenheit, Gabriel D.		Röntgen, Wilhelm K.
Faraday, Michael		Tesla, Nikola
Foucault, Jean B. L.		Torricelli, Evangelista
Galvani, Luigi		Volta, Alessandro
Gay-Lussac, J. L.		Watt, James

PHYSIOGNOMY, *fiz'og'no'mi*, the so-called science of reading character in the countenance. In a treatise believed to have been written by Aristotle is found the first attempt to systematize character-reading by means of bodily signs. In this essay such qualities as courage, vanity, prudence, are supposed to be invariably associated each with some certain physical characteristic. The writer observed that each animal has a special dominant trait; for instance, the fox has cunning; the wolf, ferocity. By analogy he concluded that a man whose face bore resemblance to a particular animal must have that animal's disposition. All this, of course, is absurd and quite in keeping with the naïve

"science" of antiquity. In the latter part of the eighteenth century Lavater, a Frenchman, developed an elaborate system of physiognomy, the scope of which he enlarged so as to include all the supposed relations between the physical and moral nature of man. A scientific exposition of the subject was written in 1806 by Sir Charles Bell, and the scientific view was advanced by the work of Darwin.

Biological science has shown that much of the human play of features is a survival of animal expression of feeling. Thus the polite sneer is but a refinement of the ferocious snarl of our simian ancestors, and indicates a survival also of ferocity, diluted, perhaps, in the one who sneers. Suppression of certain emotions and the cultivation of others is supposed in time to work changes in the face. There is no doubt that certain fixed attitudes of mind become in time reflected in the countenance. The optimist's mouth has a tendency to tilt up at the corners, the pessimist's to droop. The study of human features is intensely interesting, if based on scientific method and not on the pseudo-scientific and "occult" notions of the phrenologist.

PHYSIOGRAPHY See PHYSICAL GEOGRAPHY

PHYSIOLOGY, *fiz'i'ol'o'ji*, that branch of science which treats of the structure, functions and processes of the human body. As usually studied it is divided into three branches. These are *anatomy*, which treats of the structure of the human body, *physiology*, which describes how the various parts of the body work together to perform their functions; and *hygiene*, which instructs one in the ways by which the body may be kept in health.

The human body is at once a home and a machine. It is the home of the mind and the soul; we know little about the mind except that we have by observation and study worked out many of the laws by which it operates. The mind and the soul may be one and the same thing, for aught we know. With these physiology is not concerned, except as we view the mind and body as landlord and tenant.

A Machine Which Repairs Itself. Viewed as a machine, the human body is the most wonderful mechanism of which we have knowledge. In a general way, each of us is acquainted with this matter-of-fact statement. So perfect is the healthy body in the per-

Outline for Study of the Human Body

I ORIGIN OF LIFE

- (1) Cell
 - (a) Protoplasm
 - (b) Nucleus

(5) Hearing (See outline on the ear)

Questions on Physiology

II TISSUES

- (1) Osseous tissues or bones
- (2) Muscular tissues or flesh
- (3) Other connective tissues
 - (a) Areolar
 - (b) Adipose or fat
 - (c) Cartilage or gristle
 - (d) Marrow
- (4) Nerves

How many bones are there in the human body?

In what way is a combination of strength and elasticity secured for the spinal column?

Explain, in a general way, the functions of the spinal column

How are the bones of the head united?

Why are the bones more likely to break in old age than in youth?

Are the teeth a part of the skeleton?

How many ribs has man?

What is the collar bone?

What are the two forms of muscular tissue?

Name the three classes of muscles

What is the chief function of fat?

Explain cartilage.

What is marrow?

What is respiration?

Name the organs of respiration

Describe the lungs and bronchi

What is bronchitis? Tuberculosis?

What is the function of the salivary glands?

Explain the work of the stomach

What part does the liver play in digestion?

What are some of the causes of indigestion?

What do we mean by the nervous system?

What is a nerve?

Explain the difference between sensory and motor nerves

What are the two divisions of the nervous system?

What organ is the center of the nervous system?

What is the average weight of the brain?

How does the skull protect the brain?

Why is such great protection necessary?

What is meant by reflex action?

What is the first requisite of a healthy nervous system?

III CIRCULATION

(See outline accompanying article on Circulation)

IV RESPIRATION

- (1) Organs
- (2) Function
- (3) Movements
- (4) Hygiene
- (5) Diseases

V DIGESTION

- (1) Organs
 - (a) Stomach
 - (b) Intestines
 - (c) Liver
 - (d) Other organs
- (2) Processes
 - (a) Absorption
 - (b) Secretion
 - (c) Elimination of waste

VI NERVOUS SYSTEM

- (1) Definition
 - (a) Nerve centers
 - (b) Nerves
 - (1) Sensory
 - (2) Motor
- (2) Divisions
 - (a) Cerebro-spinal
 - (b) Sympathetic
- (3) Organs
- (4) Functions
 - (a) General
 - (b) Special
 - (1) Touch
 - (2) Taste
 - (3) Smell
 - (4) Sight (See outline on the eye)

Wonder Questions in Physiology

What is the smallest unit in the human body?

The unit of structure, or start in life, as it may be called, is a cell of protoplasm. Every one of us is made up of countless numbers of cells, each of which is perhaps one-thousandth of an inch in diameter. These cells multiply by dividing into two parts for each part becomes a new cell and continues the process. Different sets of cells are grouped together for special purposes. Some form nervous tissue, others form bone, and so on.

What makes our muscles move?

There are two kinds of muscle, voluntary and involuntary. The first kind move when we consciously will to have them do so, as when we reach out a hand and pick up a book. The second kind move without conscious effort on our part, as the muscles that move the food about in the stomach. Voluntary muscles are composed of numerous tiny fibers each of which is connected with the brain by a nerve, when the brain wills it, the message to contract is sent along the nerve, and the muscle obeys the signal. Involuntary muscles are also stimulated by nerves which come from nerve centers, but we cannot control their contractions.

What causes the pulse beat which can be felt in the wrist or at the temples?

The pulse is the swelling of an artery. At each beat of the heart a certain amount of blood is forced into the great artery called the aorta. The aorta and all its branches throughout the body are already full of blood, and the extra blood forced into them causes a wave that can be felt at the wrist and temples. This is because the arteries in these places are near the surface of the body. But the same swelling is taking place in arteries all over the body.

Why does blood circulate through the body?

It is by means of the blood that nourishment is carried to the cells of the body, and worn-out tissues are repaired and built up. Though the food enters the stomach in a partially solid state, it is reduced to liquid form by the action of the digestive juices. Through the walls of the small intestine the fluid food passes into a network of blood vessels, and is then carried into the blood stream. In circulating through the body the blood also carries waste matter to the lungs, kidneys and skin, which take the waste out of the

circulating fluid and cast it out of the body.

What is the difference between the veins and arteries?

Arteries distribute blood poured out from the heart, and veins collect it and return it to the heart. The arterial system begins with a single large tube, the aorta, from this tube branch out many other tubes which grow smaller and smaller until they pass into the capillaries. At the opposite end of each capillary is a minute vein. These tiny veins unite to form larger tubes, and this is repeated until all unite to form two large veins. Both arteries and veins have walls composed of three coats, but those of the veins are not so thick as those of the arteries. Therefore the arteries keep their tubelike shape whether they are filled with blood or not, while the veins collapse when not filled. If a vein is cut blood flows from it in a slow, even stream, but the blood from a cut artery issues in jets.

Why does the mouth become dry when one has "stage fright"?

The mouth is kept moist by the flow of saliva from special glands. When one becomes nervous the salivary glands are affected in such a way that the secretion of saliva is checked. This makes the mouth dry and speaking becomes difficult.

What gives the blood its red color?

Blood is red because it contains millions of tiny red disks called corpuscles. It contains white corpuscles as well, but these are not nearly so numerous as the red ones. About five million of the latter are contained in a drop of blood the size of a pinhead. A single red corpuscle under the microscope looks pale yellow, as also does a drop of blood when spread out on a piece of glass. Crowded densely together in a mass however, millions of these corpuscles look red.

Should one exercise violently after a heavy meal?

The answer to this question is no. The digestion of a hearty meal calls for a goodly supply of blood in the walls of the stomach and this means that the heart must beat faster and harder to supply the needed blood. If, when the food is digesting, one exercises too actively, the muscles as well as the stomach, will call for a good deal of blood, and neither will get the proper amount. As a result the heart will work too hard, and the food will not digest properly.

What causes the ridges on the inside of the finger tips?

These ridges indicate where the outer skin, or epidermis, fits onto the inner skin, or dermis. The upper surface of the dermis is covered with minute elevations called papillae, while the inner surface of the epidermis has tiny pits corresponding to the projections of the dermis. These are molded onto each other in such a way that the rows of papillae are seen on the epidermis as fine ridges. Though they occur in other parts of the body, the papillae are especially well developed on the inside of the hand. Those on the thumb and finger tips are used as identification marks in the detection of criminals, for no two persons ever have identical markings. An interesting story by Mark Twain, entitled Pudd'nhead Wilson, is based on this fact.

What is the cause of wrinkles?

Beneath the dermis there is a loose tissue in which fat is deposited. When the tissue is well supplied with fat the skin appears smooth and well filled out, but when the fat is used up the skin becomes too large for the part it covers and shrivels up. The best way to get rid of wrinkles is to build up the tissue.

What makes hair turn gray?

The color of hair is determined by a pigment in the cells which occupy the inside of the hair. When hair turns gray it is a sign that there is a deficiency of pigment. Since less pigment is secreted in old age elderly people almost always have gray or white hair. Illness, worry and shock are other causes of graying hair, and there are reliable reports of hair turning gray over night.

Why is the sense of smell deadened when one has a cold?

The cells in which the nerves of smell terminate are distributed in the mucous membrane which lines the upper part of the nose. When one has a cold in the head the membrane is inflamed, and the nerve endings become covered with too much mucus. This greatly impairs the acuteness of the sense of smell.

What makes the mouth water when one smells an appetizing odor?

Such an odor stimulates the salivary glands and causes an additional secretion of saliva. The response of the glands to the odor is an example of reflex action.

Why does one grow faint and find breathing difficult on a high mountain?

At sea level the air is everywhere pressing upon the body in the ratio of about fifteen pounds to the square inch. Since this

weight is balanced by an equal pressure of air inside the body, it is not noticed. As one climbs a mountain the air becomes continually lighter, until at a height of three and one-half miles it is only half as dense as at sea level. Because the pressure on the body is correspondingly lessened, the flow of blood is distributed, and the climber becomes dizzy and faint. At this height, too, a lungful of air contains much less oxygen than at sea level, and it is difficult to supply the lungs.

What causes the small crescent-shaped spot at the base of each finger nail?

Our nails grow from cells at their roots. When the cells first form they are soft and tender, and are opaque and whitish, like the other skin. As they grow, however, they become hard and transparent, and we can see the pink true skin through them. Therefore the upper part of the nail has a rosy tint, while the nontransparent spot at the base is white.

Why do we become thirsty easily in warm weather?

Though thirst seems to be merely a dryness of the mouth and throat, it is more than that. The sensation is an indication that there is a lack of water in the tissues of the body. In warm weather the body perspires freely, reducing the water content of the tissues. As a result there is created the desire for water, or thirst.

How can a disordered stomach cause pain in the head?

A disordered stomach means a case of indigestion, and undigested food means the manufacture of poisons in the system. These poisons or toxins, as they are often called, get into the blood and are carried to the nerves of the head. The nerves of the head are easily irritated, and so a headache is frequently a danger signal that the stomach is not working properly.

What is the cause of bodily fatigue?

We know that we become tired when we exercise too vigorously, take too long a walk, work too hard, etc. What is actually taking place is this: the working muscles are continually throwing off poisonous substances, and the accumulation of these toxins causes the state we know as fatigue. Toxins constitute the waste material which is thrown off by the muscles faster than the blood can carry it out of the system. Impoverished blood is another source of fatigue, since such blood does not carry sufficient nutriment to the muscles to permit them to work normally. That is why an anæmic person tires more easily than one whose blood is rich. Fatigue is a warning that the body needs rest.

PHYSIOLOGY

Digestion

- 1 Begins in the mouth by means of the saliva.
- 2 In the stomach the food is mixed with the gastric juices, the albumens changed into soluble peptones.
- 3 Average time occupied in digestion from three to four hours.
- 4 Intestinal juices complete the work, and chyle, the digested food, is ready for absorption.

Muscles

- 1 Make up one-half the weight of the body. The organs of movement.
- 2 Involuntary muscles those not under the control of the will. Receive their nerves from the sympathetic system.
- 3 Voluntary muscles. In bundles of fibers, as much in length. Penetrated by nerves from the cerebro-spinal system, under the control of the will.

Bones

- 1 Constitute the framework of the body
- 2 Protect vital organs such as the heart and lungs.
- 3 Consist of 34 per cent animal matter, and 66 per cent mineral substances.
- 4 Reach their perfection in the temperate zones between the ages of 20 and 25. From that to 50 change slightly, and after that grow thinner and more brittle.
- 5 Covered by a firm membrane called the periosteum.

Nervous System

- a. Cerebro-spinal system.
 - 1 Includes brain, spinal cord and nerves branching out from them
 - 2 The brain, the center of the nervous system and seat of consciousness. Weight of brain of the average male European about 50 ounces, that of female, 45 ounces. The largest brain known, that of Cuvier, about 64 ounces. The substance of the brain, gray and white tissue
 - 3 The spinal cord, a mass of nerve matter about 18 inches long
 - 4 The Sympathetic system.
- a. A series of ganglia, extending from the head, through the neck, thorax, abdomen, to the pelvis
- b The nerve centers of the head, by nerve fibers, control the pupil of the eye
- c The organs of special sense bring to their brain external impulses, and the result is sight, hearing, touch, taste, smell, etc.

Respiration

- 1 The objects of respiration are to supply the necessary oxygen, and carry off the carbon dioxide
- 2 The quantity of air in each act of respiration, from 20 to 30 cubic inches.
- 3 The quantity which cannot be expelled, but remains in the lungs, about 100 cubic inches.
- 4 About 684,000 cubic inches pass into and out of the lungs of an adult every 24 hours.

CIRCULATION

Heart

- 1 A hollow muscular organ which forces the blood through veins and arteries.
- 2 Has four chambers, two auricles and two ventricles.
- 3 Suspended in the chest by large blood vessels, is about five inches long, and its average weight in an adult from 9 to 10 ounces.
- 4 In 1628 Harvey pointed out the connection between the heart, arteries and veins, the reverse directions taken by the blood in the different vessels, the valves in the heart and veins

Arteries

- 1 The system of tubes which carry the blood from the heart to all parts of the body
- 2 The three coats. An outer elastic one, a middle muscular one which contracts and forces the blood along, an inner smooth one that the blood may move easily
- 3 Arterial blood leaves the left ventricle of the heart, passes through the capillaries, giving up oxygen and taking carbonic acid, returning to the heart by the veins through the right auricle

Capillaries

- 1 The fine blood vessels which connect the arteries with the veins.
- 2 Some so small that but one blood corpuscle at a time can pass through. They are smallest in the brain.
- 3 In certain organs they divide and subdivide, forming a network.
- 4 Capillary walls are thin, composed of but one layer of tissue
- 5 Through them the blood receives waste products and gives up nutritious material.

Veins

- 1 A system of tubes for the purpose of returning the impure blood to the heart and lungs, after it has been carried to the various parts by the arteries.
- 2 They originate in the capillaries as tiny tubes, and as they unite they decrease in number and increase in size
- 3 The two large veins empty into the right auricle of the heart.
- 4 Like the arteries they have three coats.
- 5 The valves are arranged in pairs, and prevent the blood from going backward

formance of its various functions that almost instinctively we become negligent in its care, assuming that so wonderful a machine has within itself such powers of recuperation that special care is not needed to keep it in perfect condition. It we indulge this view of the case we are in serious error, although it is true that the body will stand more abuse and show fewer signs of damage than any other machine or organism. These are only surface indications, however.

The fact is recognized that few people give proper regard to the functioning of the organs of the body. Many are more concerned, seemingly, about mechanical devices that minister to their pleasure than they are with the essential factors of health. A man will care scrupulously for his automobile, which he expects to dispose of within a year or two, but he relies upon nature to keep in good running order the body which must serve a lifetime. Boys mechanically inclined know all about the parts of an automobile and acquire much knowledge of airplanes and the science of flight, with respect to the mechanism of the body and the means of keeping it effective they manifest little concern. Most assuredly the greatest responsibility of life is to know how to keep well. It is fortunate that the Maker gave us bodies that usually function so perfectly.

Know Thyself The subjects named in the next column cover the essential facts of physiology.

Some Effects of Wrong-Doing The skin contains more than two million openings, and each opening is the outlet of a sweat gland. Each sweat gland is designed as a river to carry off waste matter of the body, each perspiratory duct is nearly one-quarter of an inch in length, and they have a total length in the body of nearly nine miles, yet by refusing to bathe regularly countless millions of people dam up these rivers of health.

The full capacity of the lungs is nearly 320 cubic inches. These lungs must be fed with pure air, the life-giving principle of which is oxygen, yet we will work and we will sleep in rooms in which there is practically no circulation of air, and we starve our lungs and poison ourselves by breathing over and over again the air which the lungs have already expelled as unfit for further service. Scientifically stated, the exhalation from the lungs is carbonic acid gas, poisonous to animal life. Regular breathing is at the

rate of eighteen times per minute, and each hour there is inhaled about 3,000 cubic feet, in the course of one hour, therefore, the exhalations of impure air are about 375 hogsheads, for the quantity of air exhaled is equal to the amount inhaled. A simple problem in arithmetic will demonstrate how deadly the air in a closed room will soon become.

The stomach daily produces nearly ten pounds of gastric juice for the digestion of food. This is ample if we eat properly, masticate thoroughly, and do not overload the stomach. Surely that organ is made to suffer when loaded beyond proper capacity and unable to provide sufficient digestive fluids to care for what is consigned to it.

Three-fourths of the weight of the human body is water and one-fourth is animal matter. There is rapid absorption of liquids to all the parts of the body, resulting in the sensation we know as thirst, which is simply the call of the body for more liquid. The only drink a person needs is pure water, yet immense industries with fabulous sums of money in capital exist throughout the civilized world to provide harmful and even dangerous drinks and stimulants to take the place of pure, free water. One of the reasons for the study of physiology is that the laws of practically every state demand that the child be taught the evil effects of strong drink upon the tissues of the body.

Related Articles Below are listed the subjects treated in these volumes that are directly related to the subject of physiology. Attention is also directed to the topics listed at the end of the articles Disease and Medicine.

Abdomen	Connective	Joints
Absorbents	Tissue	Jugular Vein
Absorption	Cough	Kidneys
Adenoids	Diaphragm	Lachrymal
Alimentary	Digestion	Glands
Canal	Ear	Lacteal
Anatomy	Embryo and	Larynx
Aorta	Embryology	Ligament
Arm	Eye	Liver
Arteries	Face	Lungs
Axle	Fat	Lymph
Bacilli	Fatigue	Lymphatics
Biceps	Fatty De-	Mastication
Bile	generation	Membranes
Blood	Fibrin	Mouth
Blushing	Fletcherizing	Mucous
Bone	Food	Muscle
Brain	Foot	Muscle Sense
Breathing	Gall Bladder	Nails
Capillaries	Ganglion	Nerves
Cartilage	Gastric Juice	Nerves Cranial
Cell	Glands	Nervous System
Cerebellum	Hæmoglobin	Nose
Cerebrum	Hair	Nutrition
Chest	Hand	Palate
Chyle	Headache	Pancreas
Chyme	Health	Pelvis
Cilia	Heart	Peptones
Circulation	Hemorrhage	Pericardium
Color Blindness	Hiccough	Peritoneum
	Intestines	Perspiration

Pharynx	Sleep
Pleura	Smell
Pulse	Snoring
Reflex Action	Spinal Cord
Saliva	Spleen
Scalp	Starvation
Secretion	Stomach
Senses, Special Taste	Tendons
Serous Mem-	Teeth
branes	Thirst
Skeleton	Throat
Skin	Trachea Duct

Tissues
Tongue
Tonils
Touch
Trachea
Urine
Veins
Villi
Vision
Voice

PIAN'O, or **PIAN'OFORTE**, a musical stringed instrument. The strings are extended over bridges, resting on a thin wooden vibrating sounding board, and are made to vibrate by means of small felt-covered *hammers*, which are put in motion by levers connected with *keys*, pressed by the fingers of the performer. There are also *dampers*, which deaden the sound after the note is struck.

The name *pianoforte* is compounded of two Italian words, signifying *soft* and *strong*, it was so called by the inventor to emphasize the difference between it and its immediate predecessor, the harpsichord, an instrument which had no mechanism for modulating the tone.

The mechanism by which the movement of the piano keys is conveyed to the strings is called the *action*, and in no part of the instrument is careful adjustment of parts more necessary, in order to produce an agreeable and firm quality of tone. When these parts are correctly adjusted, a skilful performer, by carefully controlling the force with which he strikes the keys, as well as the manner of striking, can produce tones of widely different quality, to accord with the purpose and meaning of the composition. There are usually three strings for each note in the higher and middle octaves, for the lowest notes, one, and for intermediates, two. The strings are of steel wire. The strings of the lowest notes are wound with a double coil of brass wire, and those next above are wound with single coil. All pianos have two *pedals* and some have more. These are worked by the feet, and when pressed down, by moving the hammers or dampers, with relation to the strings, they regulate the intensity of the stroke of these mechanisms and consequently control the quality and intensity of the sound. The compass of pianos is six and seven-eighths or seven octaves.

The invention of the piano can scarcely be ascribed to any one man. A grand piano embodying the fundamental principles of the pianoforte was made by an Italian of

Padua, Bartolommeo Cristofori, in 1711. It was nearly seventy-five years before any noteworthy improvement was made, then in 1783 an Englishman named Broadwood invented pedals. The first upright piano, made in 1800, was the invention of another Englishman, John Isaac Hawkins. Among the principal improvers of the pianoforte are Sebastian Erard, the founder of the celebrated firm still in existence, Roller et Blanchet, the French firm, which introduced the upright piano; Collard, Bechstein; Steinway, and many others.

PIANOPLAYER, an instrument designed for playing a piano automatically. There is a little hammer opposite each piano key, except those at the extreme ends of the keyboard, the hammers being operated by air pressure, produced by a bellows operated by the feet of the performer. The action of each hammer depends upon the suction of air into its tiny compartment, the suction being regulated by the passage of a sheet, previously perforated to correspond to a selection of music, over a row of tiny openings. By means of levers and strings the tune of the music, as well as the intensity and duration of the tone can be regulated. The radio has rendered the pianoplayer and the autograph piano of little value.

The *autograph piano* reproduces in minutest detail the performance of an individual artist by means of autograph, or perforated, rolls prepared by a secret process, which render unnecessary the devices on the piano player which control the personal interpretation by the operator.

PIASTER, or **PIASTRE**, the monetary unit of Turkey, a gold coin equivalent to about $7\frac{1}{2}$ cents of American money. Silver half-piasters, copper piasters (equivalent to $\frac{1}{16}$ the silver piasters), copper paras (equivalent to $\frac{1}{40}$ of the silver piaster), silver 20-piasters, gold 25-piasters, gold 100-piasters and gold 500-piasters are also coined. The same name is applied to coins of other nations. The Egyptian piaster is about one-hundredth of the English pound sterling, or about five cents. The Spanish piaster is the same as the *peseta*.

PICCOLO, *pi'l'o lo*, a small flute. It has the compass of the ordinary flute, but the notes all sound an octave higher than they are written. The piccolo is made in three keys C, D flat and E flat. It is indispensable in certain orchestral compositions, and in

much band music its notes are unmistakable. One of the stops of the pipe organ is called piccolo.

PICK'EREL, the name applied to a number of species of the smaller fish belonging to the pike family. They have large mouths and long, slender bodies. The species best known in North America are the *banded pickerel*, occurring in the eastern part of the United States from Massachusetts to Florida, the *little pickerel*, found in the Mississippi Valley, and the *Eastern pickerel*, found in lakes and streams in the Eastern and North Central states. This pickerel may attain a length of three feet. It is a stubborn fighter when caught with a hook, and furnishes good sport for anglers. The flesh is firm and of good flavor.

PICK'ETT, GEORGE EDWARD (1825-1875), an American soldier, born in Richmond, Va. He graduated at West Point and served with distinction in the Mexican War, also on the Western frontier, but at the opening of the Civil War he resigned from the army and became a major in the Confederate service. He rendered distinguished service in the Peninsula campaign, was promoted to the rank of major-general, fought at Fredericksburg and led the famous charge at Cemetery Ridge in the Battle of Gettysburg. During the remainder of the war he held numerous important commands, and at its close he engaged in business in Richmond.

PICKLES, *pick'ls*, vegetables and certain fruits steeped in strong brine and preserved in vinegar, served as a condiment or delicacy to whet the appetite and to add spiciness to food, especially to meat and fish courses. Owing to the corroding effects of brine and vinegar, the use of metallic vessels should be avoided in the making of pickles. Vegetable pickles are made from cauliflower, cucumbers, tomatoes, gherkins, onions, mushrooms, and nasturtium seeds. *Piccalilli*, or Indian pickle, is a mixture of various vegetables and spices pickled together. *Chouchow*, similar to it, has the addition of mustard. The popular *dill pickle* is a cucumber pickle flavored with dill. Because of its large quantity of water, the food value of the pickle is low.

PICRIC ACID, a solid acid produced by the action of nitric acid on organic substances. For commercial purposes it is produced by adding nitric acid to a mixture of carbonic acid and sulphuric acid. It is used chiefly in the manufacture of high explosives.

The acid colors animal fibers yellow, but does not act on vegetable matter, it has been used to test fabrics suspected of containing cotton, also as a dye for silk.

PICOTS, the name given to the ancient Caledonians, usually regarded as a Celtic race, inhabiting North Britain till the beginning of the sixth century.

PIEDMONT, *peed'mont*, a territorial department of Italy, in the northern part of the kingdom. It embraces the provinces of Cuneo, Novara, Turin and Alessandria, and is bounded by France, Switzerland, Liguria and Lombardy. The area is about 11,300 square miles. It lies in the upper valley of the Po and derives its name, which means *foot of the mountain*, from its position at the base of the loftiest ranges of the Alps, which enclose it on all sides except toward the Lombard plain. It is one of the most fertile and beautiful regions of Europe, undulating in slopes and terraces to the plains of the Po. It produces, extensively, wheat, maize, rice, hemp, sugar beets and fruits and large quantities of silk. It has a population of about 3,424,450. Piedmont formed the most important part of the kingdom of Sardinia. See **SARDINIA**, KINGDOM OF.

PIEDMONT, *peed'mont*, **REGION**, a plain lying along the Atlantic coast in the United States between the Appalachian Mountains and the low coastal plain proper. It is more rugged than the latter, contains harder rock strata and is separated from it by a clearly marked line of escarpments over which most of the rivers which cross it on their way to the Atlantic fall in cataracts or rapids. This line is known as the "fall line." The Piedmont plain is broadest in North Carolina, where it attains a breadth of 300 miles and is more clearly defined than in the Middle Atlantic and New England states. The word *Piedmont* is from the French and means *foot of the mountains*.

PIER, *peer*, in architecture, the name applied to a mass of masonry between openings in a wall, such as doors or windows, and to the solid support from which an arch springs or which sustains a tower. In medieval architecture the pier was a square column. The term is also applied to a mole or jetty carried out into the sea, intended to serve as an embankment to protect vessels from the open sea and to form a harbor. In buildings the term is used to designate the column with base, shaft and capital.

PIERCE, FRANKLIN (1804-1869), an American statesman, the fourteenth President of the United States. His administration was notable for the repeal of the Missouri Compromise and the birth of the Republican party—the party that was destined to shape the nation's policies for many years afterward. The Missouri Compromise, passed in 1820 and designed to set a limit to the extension of slavery in the states, became inoperative in Pierce's administration by the passage of the Kansas-Nebraska Bill. As a result, the slavery issue was reopened, and the nation was plunged into a controversy that ended in civil war.

Franklin Pierce was born at Hillsborough, N. H., on November 23, 1804. He was the son of a man who had fought as an officer in the Revolutionary War and had served two terms as governor of New Hampshire. Franklin attended Bowdoin College from 1820 to 1824, and formed there a notable friendship with Nathaniel Hawthorne. After his graduation he studied law, and in 1827 was admitted to the bar. His inclinations, however, led him to enter political life, and between 1829 and 1832 he was four times elected by the Democrats to the New Hampshire legislature, being speaker for two terms. In 1832 he was sent to the national House of Representatives, retaining his seat in the election of 1834. Pierce had the honor of being the youngest member of the United States Senate when the New Hampshire voters elected him to that body in 1837. He was then but thirty-three years of age.

The young Senator from New Hampshire became an associate of such eminent political leaders as Webster, Calhoun and Clay, but though he did not equal them as a national figure, he created a good impression by his independence and sincerity. Pierce was an honest supporter of the Jackson and Van Buren policies, but he refused to uphold the doctrine, "to the victor belong the spoils," inaugurated in Jackson's administration. Resigning from the Senate in 1842, he took



FRANKLIN PIERCE

up law practice, and for five years remained out of politics, though several offices of importance were tendered him. When the Mexican War became a certainty he volunteered as a private. President Polk soon commissioned him a colonel, and later made him brigadier-general of volunteers, after which he helped in the fighting at Contreras and Churubusco.

Between 1848 and 1862 Pierce engaged in law practice at Concord, N. H., and as he did not identify himself with any of the factions of his party, the Democrats looked upon him as a safe candidate for the Presidency. The convention which nominated him adopted a resolution pledging the party to carry out faithfully the Compromise of 1850. In the election Pierce won over the Whig candidate, General Scott, by an electoral vote of 254 to 42.

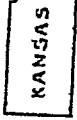
His Administration. The passage of the Kansas-Nebraska Bill, early in 1854, was the first important event touching on domestic policies. It embodied the pet theory of Senator Stephen A. Douglas of Illinois that new territories should decide the slavery question for themselves. This squatter sovereignty doctrine, as it was called, had a demoralizing effect that would have been foreseen by a broader-visioned man than President Pierce. It made Kansas a bloody battleground and stirred public passions to a high pitch. Bitter speeches were made in Congress, and the North was roused to a frenzy by a brutal attack on Senator Charles Sumner by Representative Preston S. Brooks of South Carolina. In the midst of the storm and stress the Republican party held its first national convention in Philadelphia, in June, 1856.

President Pierce, aided by his efficient Secretary of State, William L. Marcy of New York, pursued a vigorous foreign policy throughout his administration. In 1853 Captain Ingraham of the United States steamship *Saint Louis* forced Austrian authorities to release Martin Koszta, an Hungarian refugee who had previously sought protection in the United States, but had returned to Europe before complying with all the formalities of naturalization. The favorable attitude with which the administration regarded Ingraham's action was characteristic of the President's attitude on all matters touching American dignity.

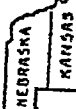
In 1853 the Mexican boundary question was settled by the Gadsden Purchase, and in



Sumner-Brooks



*Border Warfare
Bleeding Kansas*



*Squatter Sovereignty
Abolitionists
Black Republicans*



*N-E Emigrant Assn
Sons of Freedom*



*Borderers
Border Ruffians*



*First Worlds Fair
Crystal Palace
Labor-Saving Exhibit*

1853



*Gadsden Purchase
1853*



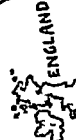
*Perry's Treaty
1854*



*Martin Koszta
1854 Affair*



*Ostend Manifesto
1853*



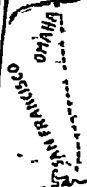
*Fishing Dispute Ended
Reciprocity Ended
1854*



*Walker's Filibustering
Expedition to
Central America 1854*



*Sound Question
Discontinued 1854*



*Pacific R.R. Expedition
Congress Ordered Survey*

1857

PIERCE'S

ADMINISTRATION

FOREIGN AFFAIRS

DOMESTIC AFFAIRS

Administration of Franklin Pierce, 1853-1857

I. THE PRESIDENT

- (1) Birth
- (2) Parentage
- (3) Youth
- (4) Education
- (5) Character
- (6) Public life
- (7) Death

- (4) Result
- (d) Trouble with Spain
 - (1) Due to filibusters in Cuba
- (2) President's attitude
- (3) Southern leaders opposed acquisition of Cuba

II. GOVERNMENTAL AFFAIRS

- (1) Domestic
 - (a) Inaugural address
 - (1) A statement of policy
 - (2) Effect on the people
 - (b) Kansas-Nebraska Act
 - (1) Doctrine of popular sovereignty
 - (2) Terms of the Act
 - (3) Object
 - (4) Results

- (e) Treaty with England
 - (1) Ended dispute about fisheries
 - (2) Reciprocity with Canada

- (f) Treaty with Japan
 - (1) Negotiated by Perry
 - (2) Opened Japan to American Commerce

III. INTERNAL AFFAIRS

- (1) Yellow fever epidemic in New Orleans

- (2) Crystal Palace Exhibition

IV. THE CAMPAIGN OF 1856

- (1) National conventions
- (2) The issues
 - (a) Popular sovereignty
 - (b) Kansas
- (3) The candidates
- (4) Significance of the election of Buchanan

Questions on Pierce

When was Franklin Pierce born?
What college did he attend? Who were some of his classmates?

Explain the doctrine of popular sovereignty.

Who was its greatest exponent?
What did he seek to accomplish by the Kansas-Nebraska Act?

In what way was it a violation of the Missouri Compromise?

How was it received by the North? By the South?

Who attacked Charles Sumner? Why?
What was the Lecompton Constitution?
Who was John Brown?

What different elements made up the new Republican Party?

What was the Ostend Manifesto, and why so called?

- (2) Foreign
 - (a) Case of Martin Koszta
 - (1) Seized by Austrian authorities for part in rebellion
 - (2) Protest of the United States
 - (3) Koszta freed
 - (b) Ostend Manifesto
 - (1) Issued by United States ambassadors
 - (2) Declared acquisition of Cuba desirable
 - (c) Gadsden Purchase
 - (1) By whom negotiated
 - (2) Price
 - (3) Object

1854 a treaty was negotiated which adjusted an old dispute with Canada over the Atlantic fisheries. The American minister at Madrid came close to involving the country in a war with Spain over the question of Cuban annexation, and relations also became strained with England because the British minister at Washington was apparently undertaking to obtain recruits for the Crimean War. In each case, however, trouble was averted. In connection with the Cuban complication the famous Ostend Manifesto was issued. Other notable events touching on foreign relations were the expedition of Perry to Japan, whereby Japanese ports were opened to trade, and the filibustering adventure of William Walker in Nicaragua.

President Pierce was not a candidate for reelection, and at the end of his term he retired to private life. Several years were spent in European travel. He died in October, 1869, and was buried at Concord, N. H. He is regarded by historians as an honest, capable official, but not as a great statesman.

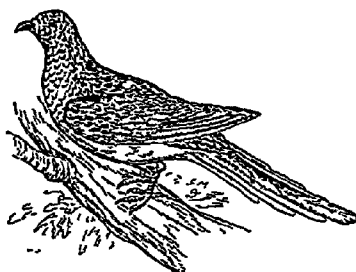
Related Articles Consult the following titles for additional information
 Gadsden Purchase Perry, Matthew C
 Kansas (history) Republican Party
 Kansas-Nebraska Bill Squatter Sovereignty
 Ostend Manifesto Walker, William

PIERRE, *peer*, S. D., the capital of the state and the county seat of Hughes County, is 150 miles up the Missouri River from Yankton, the old territorial capital. The river is not considered at all important for navigation in this part of its course. The surrounding country is rich in undeveloped resources. The Chicago & North Western Railroad was built to the city in 1883, and extended westward in 1907. There is a Federal building, a fine state capitol (See South Dakota), an imposing railroad station, a War Memorial Building and City Auditorium. The commission form of government has been adopted. Population, 1920, 3,209, in 1930, 3,659.

PIGEON, *pifun*, the name of a large group of birds found in all parts of the world, of which the dove is the best representative. Most pigeons are of medium size, and the plumage of those in the temperate regions is of a dull gray or brown or black, frequently having a metallic luster. The pigeons of the tropical regions, however, have brilliant colors. Pigeons seem to be the most defenseless of birds. They build flimsy nests in ex-

posed places, and suffer from attacks of birds and other animals. The birds pair for life, and the nest contains two eggs upon which the male and female sit in turn until they are hatched. Some pigeons live in colonies, and some in isolated pairs. There are hundreds of varieties, but only a few are of general interest.

Passenger Pigeon This pigeon formerly existed in the eastern part of North America in countless numbers, but since early in the present century it has entirely disappeared. It was a beautiful bird about fifteen inches in



PASSENGER PIGEON

length, with delicately tinted plumage, small head and long tail and wings. Bird life sustained one of its greatest losses in the complete extermination of the beautiful passenger pigeon.

Mourning Dove. The only representative of the passenger pigeon family now remaining. It is a small pigeon and takes its name from its long, plaintive *coo-o-o*, which is its song, and not a note of wailing, as many suppose. The *turtle dove* frequently mentioned in the Bible is the Eastern representative of the species.

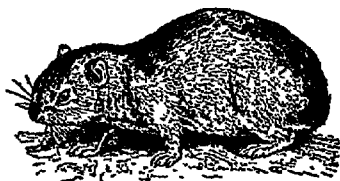
Other Species The *fantails* are so named because of their large, erect tails, which open like a fan. The *pouters* have large crops which give them a grotesque appearance. The *Jacobins* have a ruff of feathers about the neck. The *tumblers* turn somersaults in the air during flight. The *homing pigeons*, also called *carrier pigeons*, have a remarkable sense of direction. See **CARRIER PIGEONS**.

PIGMENTS See **PAINT**.

PIGWEED, a plant belonging to the amaranth family, native to tropical America, but now a common pest in the United States, thriving in almost any kind of soil. It has dull, green leaves and crowded spikes of small greenish flowers. The plant is tall and

straight, and is without spines. It is often called *beetroot*, because of its red root.

PTKA, a little animal which lives at high altitudes in Asia, Europe and the western part of the United States. It is sometimes called *cony*, calling *hare* and *little chief hare*,



CALLING HARE

although it resembles a guinea pig more than a hare. The American species is about seven inches long and has only a rudimentary tail. Its fur is a dirty black, but lighter beneath. The animals live above the timber line, in large communities, usually in piles of loose debris, advertising their presence by a chorus of squeals. They are vegetarians, and providently store up grass, hay and vegetables for winter bedding and fodder.

PIKE, a group of seven species of freshwater fishes of the pike family, the most important being the common pike, which is the only one known beyond the waters of North America. This species is one of the commonest game fishes, and under its familiar name (in America) of pickerel, is highly prized by sportsmen, it is an especially desirable food fish. The pickerel, full grown, averages twenty to thirty pounds in weight, but may reach forty pounds and a length of three feet (see **PICKEREL**). The pikes are enemies of all small fishes, on which they feed greedily, a single adult pike may eat three to five pounds of small specimens daily. The muskellunge (which see) is the largest pike, and is found mostly in northern waters. The so-called wall-eyed pike is not a pike.

PIKE, ZEBULON MONTGOMERY (1779-1813), an American soldier and explorer, for whom Pike's Peak, in Colorado, was named. He was born at Lambertton, N. J., and was taken in childhood to Eastern Pennsylvania, where he later entered the army, becoming first-lieutenant in 1800. Five years later he led an exploring expedition into the territory of the Louisiana Purchase. In 1806 he ascended the Missouri River and the Osage into the present state of Kansas, thence

southward to the Arkansas River, which he ascended to the site of Pueblo, Colo., discovering Pike's Peak. Pike was captured by the Spanish while searching for the Red River, but was later released. He was promoted through various ranks to that of colonel, and was nominated brigadier-general, but died before this commission had the Senate's confirmation. He was killed by an explosion in the expedition against York, Canada, in the War of 1812. He was the author of *An Account of an Expedition to the Sources of the Mississippi and Through the Western Parts of Louisiana, and a Tour through the Interior Parts of New Spain*.

PIKE'S PEAK, best known of the Rocky Mountain peaks in Colorado. Its snow-capped summit rises 14,108 feet above sea level. Pine forests cover its slopes to a height of almost 12,000 feet. Above this it consists of barren granite rocks. A cog railway and a wide motor road ascend to its summit, where a magnificent, widely-extended view of the great plains and mountains has awed thousands of visitors every summer. A postoffice and little curio shop are found on the summit. A searchlight which plays upon the environs adds much to their impressiveness and majesty.

PILASTER, in architecture, a square pillar, protecting from a pier or a wall to the extent of from one-fourth to one-third of its breadth. Pilasters originated in Grecian architecture. In the Roman, they were sometimes tapered like columns and finished with capitals, modeled after the order with which they were used. In the early Renaissance ornamented pilasters were very common. See **COLUMN**.

PILATE, PONTIUS, the Roman procurator of Judea, Samaria and part of Idumea from A. D. 26 to 36. He misunderstood, and was misunderstood by, the Jews, whose complaints led ultimately to his recall to Rome. Pilate is conspicuous in history in connection with the trial and crucifixion of Jesus. He examined Jesus and was convinced that he was not politically dangerous, but feared to oppose the people (see *Matthew XXVII*). Pilate was removed from his office by Vitellius, prefect of Syria, in A. D. 36, and, according to tradition, was later banished by Caligula to Gaul, where he died some years afterwards.

PILCOMAYO, *peel ko mah'yo*, a shallow river of South America, rising in Bo-

livia on the eastern slope of the Andes, and flowing southeast until it joins the Paraguay near Asuncion, after which it forms a part of the boundary between Paraguay and Argentina. The Pilcomayo has not yet been thoroughly explored, and its length is estimated at 1,200 miles. Because it is so shallow during the dry season and has such strong currents in its narrow places, the Pilcomayo will never attain great commercial value.

PILE, a long post sharpened at one end and driven into soft earth to support a building or to make a defense against water. In the former case a pile is usually a pointed log of wood, which sometimes is protected with an iron shoe, to enable it to penetrate the harder strata of the earth. Piles are most generally used in temporary structures to make cofferdams (see **COFFERDAM**). The piles now used are often of concrete.

PILGRIMS, the name first applied by Governor William Bradford to the body of English Separatists who established the first English settlement in Massachusetts, at Plymouth, Mass., in 1620. He referred to the colonists as "pilgrims and strangers upon the earth." Because they separated from the Church of England they were known as *Separatists*, and their first churches were at Gainsborough and Scrooby. Driven from England by persecution, in 1608 they established themselves at Amsterdam and Leyden, Holland, and in 1620 emigrated to America. They are also known as the "Pilgrim Fathers." See **PLYMOUTH COLONY**, **MASSACHUSETTS**, subhead *History*.

PILLORY, *pi'l'o ri*, an instrument of punishment in former times. Two boards, placed with the long, narrow faces together and joined by hinges, were mounted, their ends vertical, upon a post supported by a platform. A hole in the center of this upright board held the culprit's neck, and one on each side his wrists. In early times the pillory was used as a punishment for forgery, perjury and other dishonorable offenses. Later, milder offenses were punishable in this manner, and many eminent men were, for libel, for publishing books without license and such indiscretions, exposed to public ridicule. The pillory was introduced into the American colonies from England and was used to punish such offenders as drunkards and scolds. It was abolished by law early in the nineteenth century.

PILOT, a person qualified by experience and licensed by law to navigate a vessel within a particular district. In some ports each ship on entering and leaving is compelled to accept a port pilot to direct navigation. In the United States the power of regulating usage with respect to pilots is in the hands of Congress, however, several states pass laws for their own respective territories, in accord with the national laws governing the subject.

PILOT FISH, a fish belonging to the mackerel family. It is silver gray in color, and its body is encircled by five blue-black bands. The fish is about a foot long, and is more or less round. The name is probably attributable to the fish's habit of swimming before ships. This fish is a natural friend of the shark, which it often accompanies, picking up the bits of food its companion overlooks, and, for the time being, quite safe in such company from attack of its enemies.

PIMA, *pe'ma*, one of the principal Indian tribes living in Southern Arizona and Northern New Mexico. They are a peaceful tribe, their wars in almost every instance having been fought in defense. They are agricultural in habits, fertilizing their fields by means of extensive irrigation canals. The women are especially adept in weaving water-tight baskets and in making pottery. Once they were Pueblo Indians, living farther north, but having been driven south, they built small, dome-shaped dwellings of brush covered with earth and straw. They are very strong, industrious, and are noted for their honesty. There are at present about 4,200 Pimas.

PIMENTO, *pi men'toh*, a subtropical tree of the myrtle family, from the dried berries of which is prepared an important commercial spice known as allspice, Jamaica pepper, or pimento. The tree, which is an evergreen, grows to a height of twenty-five feet or more. The glossy, black berries, which follow the small white flowers, are gathered before maturity and prepared for the market. The pimento is a native of the West Indies and is extensively cultivated in Jamaica, which produces most of the allspice of commerce. See **ALLSPICE**.

PIN. We never place any value on a pin until we need one, and then we wonder how people once existed without such a convenience. Over 55,000,000 gross of common

toilet pins are made in the United States yearly, and when hairpins were in brisk demand, 1,800,000 gross were made yearly. The output of safety pins reaches 1,750,000 gross each year

Pin Making. Pins are made from brass wire (see WIRE) The wire is wound on a large reel, which is hung over the pin-making machine In this machine the pin is cut from the wire, headed, pointed, sharpened and polished This machine is a combination of steel fingers, rollers, cams, toggle joints, headers, revolving files and belts The wire, caught by a pair of rollers, is drawn forward into the machine where it is cut into the right lengths, two raps from a cam and toggle form the head A steel finger puts the headed wire on a wheel under the heading dies, and the pointless pin is carried down between two revolving steel disks One of them revolves faster than the other, so the pin is turned round as it travels forward Just at this point, it comes in contact with four revolving files, which point the pin, and then an emery belt puts the first polish on it The pins drop from the machine at the rate of 160 a minute and fall into a hopper, from which they are taken to the tanning room In passing from the pin machine, the pins become covered with oil and dirt, and this is removed by putting them into a revolving iron barrel, with sawdust. The tanning process consists in the pins being boiled for four hours in a preparation of pure tin. They are then washed with strong soap-suds, and polished. They are then ready to be stuck into papers

The sticking machine crimps the paper and sticks the pins in at the same time. The pins are put in a hopper from which an inclined steel plate, furrowed with little runs, or channels, leads to the machine The pins are caught by revolving steel fingers and pushed forward upon the inclined plate into the runs The runs converge to a plate, which moves slightly back and forth across the rows of slots This cutting off plate catches the pins, and when the holes are full a number of little rams or hammers shove the pins into the crimp of the paper which is formed a second before the pins are stuck in.

PINCHOT, *pin'sho*, GIFFORD (1865-), an American authority on forestry, born at Simsbury, Conn He was graduated at Yale in 1889, studied his profession in the principal countries of Europe, and on his return

to America began his first systematic forest work at Baltimore, N C (1892) He organized, developed, and made possible the great success of the Division of Forestry, of which he was chief from 1898-1910, and he took a prominent part in the conservation movement in the United States He served as United States Food Administrator in 1917-1918 He was the Republican governor of Pennsylvania for four years beginning with 1923 and was re-elected in 1930 Pinchot is author of *The Adirondack Spruce*, *A Primer of Forestry*, *The Fight for Conservation*, *To the South Seas* and joint author of *The White Pine*, and *Six Thousand Churches*

PINCKNEY, *pink'n*, CHARLES COTSWORTH (1746-1825), an American statesman, born at Charleston, S C In the Revolutionary War he attained the rank of brigadier-general, and after the war practiced law and became a member of the Constitutional Convention of Philadelphia and of the convention that framed the South Carolina constitution. Pinckney was appointed United States minister to France in 1796, and in that post is remembered chiefly for his famous response to Talleyrand's attempt to negotiate a bribe "Millions for defense, sir, but not one cent for tribute!" (see X Y Z CORRESPONDENCE) Pinckney was twice the unsuccessful candidate of the Federalists for President.

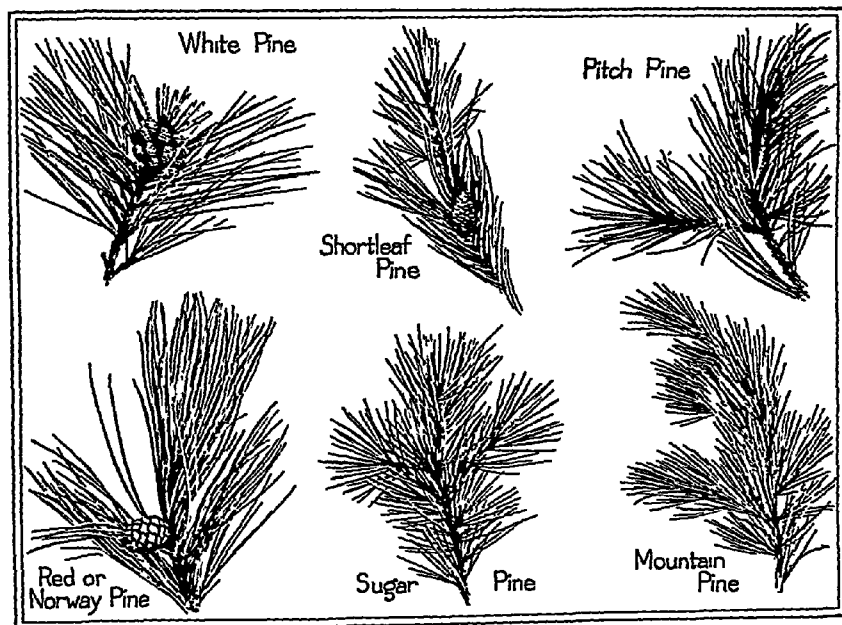
PINDAR (522?-445 B. C.), the greatest of Greek lyric poets, was born of a noble family and lived in Thebes He traveled throughout Greece and, becoming widely known, received many commissions for poems to commemorate and immortalize important events Choral lyrics, intended to be sung by choruses, hymns to the gods, processional odes, dirges, hymns in honor of the victors of the Olympic, Nemean and other Greek games, were among his productions His style is simple and majestic The noble music of his lines cannot be translated, but an admirable English version is that of Myers Pindar was the first Greek writer to express belief in the immortality of the soul

PINE, the most numerous trees of the cone-bearing family. There are about thirty-five species found in North America, and nearly as many more are known in other parts of the world The pine is characterized by its long, evergreen, needle-shaped leaves, which grow from a sheath in clusters of from one to five Its branches are arranged in whorls and project nearly horizontally. The

bark is reddish-brown, and the wood is fine-grained and adapted to many uses. In accordance with the quality of the wood, pine is classed as *hard pine* and *soft pine*. These varieties are also known as *white pine* and *yellow pine*.

White Pine. The white pine is common from Canada to North Carolina and Georgia, along the Appalachian Mountains and westward to Tennessee. In the northern part of this belt, the trees extend westward to Min-

Yellow Pine. The yellow pine or Georgia pine is found in the Southern states, from North Carolina to Florida and westward to the Mississippi, and in detached forests in Arkansas, in some portions of Louisiana and in Texas. The wood is of a color darker than that of the white pine; it is hard and fine-grained and it contains considerable pitch. It forms a strong and elastic lumber and is especially valuable in the construction of ships, bridges, viaducts and frames for large



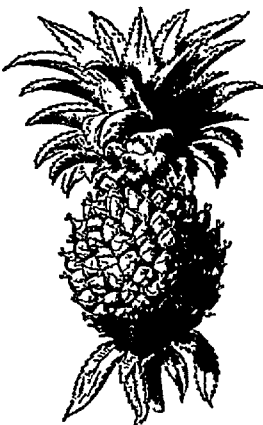
nesota, while extensive forests are found in Canada, along the Saint Lawrence and Ottawa rivers as far west as Lake Superior. The tree often attains a large size, being from 70 to 150 feet in height and sometimes having a diameter of seven feet, though trees of this size are rare. The wood is white, soft, fine-grained and durable, and it is the most useful wood in the world for lumber. This tree was the chief source of lumber in the United States and Canada for more than 250 years, but with the exception of the great forests in Idaho, and some forests in Canada, the supply is practically exhausted, and the yellow pine has taken its place for many purposes.

buildings. It is also used for flooring and inside finishing. This tree is also the source of tar, turpentine and resin (see **TAR**, **TURPENTINE**).

Sugar Pine. The sugar pine is a large tree, often attaining a height of 250 feet and a diameter of six to ten feet. It is found in the forests of Oregon, Washington and northern California. Its wood resembles that of the white pine, and the tree is a valuable source of lumber. It takes its name from the fact that white sugar crystals form on the wood when it is burned. Among other species are the *loblolly*, *swamp*, *bull*, *silver*, *red* and *nut*. See **LUMBER**; **FORESTS AND FORESTRY**.

PINEAPPLE, a delicious, fragrant tropical fruit common in all markets. The pineapple is a native of South America and the West Indies and was introduced into Europe by the early Spanish explorers. It takes its name from *pinia*, the name of the edible nut of the Spanish pine, which it closely resembles in shape. Ordinarily the fruit is about the size of a coconut, but large specimens may weigh from sixteen to twenty pounds. The plant is a biennial. It has long pointed

leaves, whose edges are in most species furnished with sharp spines. The leaves are thick and juicy. From the center of the cluster a stem rises two or three feet and bears on its upper end a flower cluster, in the form of a conical spike. Each flower is placed in the axil of a bract, except those near the



PINEAPPLE

top, which develop into a cluster of small leaves, which crowns the ripened fruit. The fruit is the thickened fleshy flower stalk, and in this respect, as well as in its odor and flavor, the pineapple somewhat resembles the strawberry. The plant requires a warm climate and abundant moisture. The fruit contains no sugar, but absorbs sugar from the stump in ripening, therefore the flavor of the fruit is greatly improved if it is allowed to ripen before picking. Its hard covering enables the pineapple to withstand more rough usage than any other tropical fruit. It will keep for a long time, and can be obtained throughout the year. These qualities, combined with its delicate flavor, make the pineapple a popular fruit.

Most of the pineapples cultivated in the United States are grown in Florida, where both soil and climate are especially favorable to their production. A few are also grown in Georgia, Texas and Southern California. The finest varieties are grown in Florida under sheds built of lath nailed to frames two or three inches apart, to protect the plants

from intense heat and frosts. Most of the canned pineapple consumed in this country comes from Hawaii. Large quantities are also imported from Cuba, Porto Rico and the Philippine Islands. European markets are supplied from Northern Africa, the West Indies, the Azores and the Canary Islands. Australia's supply comes from Queensland. In the Philippines a beautiful fabric called *pina muslin* is woven of a fiber obtained from the leaves.

PINE BLUFF, ARK, the county seat of Jefferson County, forty miles southeast of Little Rock, on the Arkansas River and on the Missouri Pacific, the St. Louis & Southwestern, and the Pine Bluff & Hot Springs railroads. It is in a fertile cotton-growing and timber region, has a large trade in cotton and lumber and contains railroad shops, cotton compresses, cottonseed-oil mills, iron works, auto-trailer factory, flooring plants and furniture factories. It is the seat of a state normal college for colored students, and the state fair is held here annually. The city has a normal school for colored students, a Federal building, large hotels and bank buildings, a courthouse, several fraternal society buildings, and business colleges. Population, 1920, 19,280, in 1930, 20,760, a gain of 7.6 per cent.

PINERO, *pin ay'o*, SIR ARTHUR WING (1855-1934), a dramatist, born in London, of Jewish ancestry. He studied law, but abandoned it for the stage. His successful farces, produced early in his career, include *The Money Spinner*, *The Magistrate*, *The Schoolmistress*, *The Amazons* and *The Cabinet Minister*. After writing *The Weaker Sex*, *Sweet Lavender* and other sentimental comedy, Pinero turned to serious drama and produced, among his best plays, *The Second Mrs. Tanqueray*, *Iris*, *Mid-Channel*, *The Benefit of the Doubt*, *His House in Order*, and *A Cold June*. Pinero was a clever craftsman, and his plays abound in witty dialogue.

PINES, ISLE OF, a small island south of Cuba. See ISLE OF PINES.

PINE SNAKE, one of the serpents of the southern part of the United States. It is sometimes called the *Bull Snake*, and often exceeds six feet in length. It is usually found in the pine lands, gives forth a strong, disagreeable odor, and feeds on eggs, birds, and small mammals. It is harmless, but when disturbed it makes a loud hissing or bellowing noise. Three or four similar species and

varieties inhabit dry, sandy regions in the interior of the country, especially in the Southwest, and in Mexico. These are brighter in color than the species found in the southeastern states.

PINE-TREE SHILLING, the name given to the largest of several coins issued by the colony of Massachusetts from 1652 to 1682, the others were sixpence and threepence pieces. The obverse side bore the expression 1652, XII, encircled by the words *New England* and *An. Dom*, the reverse side had a crude engraving of a pine tree, encircled by the words *Massachusetts In*. The weight was about seventy-two grains, and the value equivalent to eighteen and one-fourth cents. The pine-tree shilling figures in Hawthorne's tale of colonial days, *Grandfather's Chair*.

PING PONG, an indoor game based on the principle of lawn tennis. It is played on a table the proportions of a tennis court, and the balls are light hollow celluloid spheres. Light rackets shaped like tennis rackets are used. The first player who wins 21 "serves" is the victor.

PINK, an exquisite little flower with a spicy odor, a favorite in old-fashioned gardens. The blossoms are commonly pink or white, though the many cultivated species may include other tints. The name *pink* doubtless refers to the fringed edges of the petals, which may be single or double. The plant is about six inches high and has pale green grasslike foliage. Sweet William, Scotch, China, pheasant's eye, grass and feathered pinks are among the popular varieties. A closely related flower is the carnation.

PIN MONEY, in English law, a sum of money periodically paid by the husband to his wife, with which she purchased her dresses and personal adornments. The origin of the term is unknown, although it is generally attributed to the ancient tax levied in England for the purpose of supplying the queen with pins. The practice of providing pin money allowance was at one time quite common among the wealthy of England. It never gained favor in the United States. Pin money was distinguished from gifts in that the latter referred to sums given to the wife voluntarily by the husband without his indicating that they were to be used for certain specific purposes.

PIPE, TOBACCO, a small bowl fitted to a hollow stem for the smoking of tobacco. The

origin of the pipe is uncertain. Long before they were known to white men, the American Indians smoked pipes with bowls carved from a soft clay rock, and often highly ornamented, and it is probable that some sort of pipe was used in England for smoking medicinal herbs before tobacco was introduced into that country. Pipes are made of clay, cornucobs, brier root, meerschaum and a variety of other materials. Meerschaum pipes are largely made in Germany, and many of them are beautifully carved and decorated (see MEERSCHAUM). Whatever the material of which the bowl and stem are made, the best grades of pipes have mouthpieces of silver, bakelite, and amber, the last being preferred. To the American Indians the pipe often meant more than relaxation. The smoking of the pipe of peace was often an important occasion. See CALUMET.

The Eastern *hookah* is a pipe of great size, the bowl of which is set upon an air tight vessel, partially filled with water, it has a small tube which passes down into the water. The long flexible smoking-tube is inserted in the side of the vessel, and the smoke is made to pass through the water, being thus cooled and deprived of some noxious properties.

PIPEFISH, a name applied to a kind of salt-water fish, which is related to the curious little animal known as the hippocampus (which see). It has a slender body from two and a half to three feet long, covered with



PIPEFISH

bony plates, and a long tubelike snout, at the end of which is an upturned mouth. The male is equipped with a pouch, in which the eggs, and, later, the young, are carried. This fish feeds on fish eggs and small marine animals, often diving to beds of eel grass, where, with body vertical, its snout foraging in the mud, it can hardly be distinguished from the gently-waving blades of these plants.

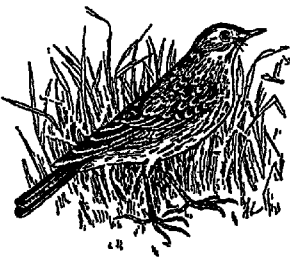
PIPE LINES, lines of wrought-iron or steel pipe, joined to form conduits of great length for the transportation of oil and natural gas. The first pipe lines for conveying crude petroleum were laid in 1862, a few years after the discovery of petroleum in Pennsylvania. Owing to defective construction, the joints leaked so badly that these

lines were abandoned. These defects were soon remedied, however, and pipe lines became a common means of conveying crude oil from the wells to the refineries. Today in the United States there are more than 93,000 miles of pipe lines, the pipes six to ten inches in diameter. Pointing eastward toward the Atlantic seaboard and northward from the Gulf area, they extend from the Wyoming, Oklahoma, Kansas, and Texas fields to the Chicago area and intermediate refining points to their Eastern terminals, the principal one being at Bayonne, N. J. Other lines are laid in the California field. From Wyoming oil reaches the Whiting (Chicago) refineries, 970 miles, in 320 hours, and Bayonne, 1,700 miles, in 560 hours. At intervals of about twenty miles pumps are stationed, to force the oil toward its destination.

Pipe lines for conveying natural gas are constructed on plans similar to those for conveying oil, the chief difference consisting in the size of the pipe. Gas mains range from sixteen to twenty-four inches in diameter. *

PIPE OF PEACE. See CALUMET.

PIPETT, or **TITLARK**, an American bird about seven inches long, having a trim, brownish body with dark streaks, and light-edged feathers. The bird lives chiefly on the ground, in open spaces, over which it runs rapidly. Because of its habit of flitting its tail, it is sometimes classed with the wagtails. The pipits spend the winter in the tropics and the summers far north, Labrador being a favorite nesting place. The eggs, lightish gray, with brown spots, are laid in grassy nests on the ground. A near relative of these birds is the Missouri skylark, which, like the true lark, sings on the wing.



PIPETT

PIPPIN. See PEPIN

PIQUA, *pi'kwá*, OHIO, in Miami County, seventy miles southwest of Columbus, on the Miami River, on the Miami & Erie Canal and on the Pennsylvania and the Baltimore & Ohio railways. The city is governed on the city-manager plan. It is in a rich farming

region, has good water power and manufactures underwear, oil-well machinery, motor hearses, furniture, and walnut veneer. There is also a meat-packing plant. The city has the Schmidlapp Library, a Federal building and a Y M C A. Population, 1920, 15,044, in 1930, 16,009.

PIQUET, *pe'ket'*, or *pi'ket*, a card game played by two persons, who use all the fifty-two cards in the deck except the twos, threes, fours and fives. Twelve cards are dealt, two or three at a time, to each player, and the remainder of the pack is placed on the table. If a player holds no face cards, he lays his hand on the table for his opponent to see, and scores ten. Then the player opposite the dealer must discard one card, and may discard five cards, and take in place of them an equal number from those that have not been dealt. If he discards less than five, he may look at the first five of the pack and make his selection. The dealer discards or not, as he chooses, but he may take all that the other has left, discarding an equal number from his hand. The players score according to certain combinations of cards, for details, consult rule books.

PIRACY, *pi'ra'si*, robbery of ships at sea by crews organized especially for the purpose. In the days when they flourished, pirates were the bandits of the sea. Their banner was a black flag, and they owed allegiance to no government. For years piracy has been punishable by death under the law of nations, yet early in the nineteenth century the United States had to fight the Barbary States to protect its ships from the pirates whose depredations were sanctioned by the governments of those states. Today piracy is little known except on China's great river systems, far from the seats of governmental authority. See PRIVATEER.

PIRÆUS, *pi'ræ'us*, the port of Athens, Greece, situated on a peninsula about five miles southwest of the city. It has three harbors, two on the east and one, the largest, on the west. More than half of the commerce of Greece passes through Piræus, which is in direct communication with Constantinople, Trieste, Alexandria and Marseilles. The manufactories are important; textiles, leather, paper, macaroni and brandy are among the products. Piræus was built when Athens became the capital of Greece, on the site of the beautiful city of the same name which flourished in the time of Pericles and which

fell into decay in the Middle Ages. The population of the modern city is 74,580.

PISA, *pe'za*, ITALY, the capital of the province of Pisa, five miles from the Mediterranean, forty-nine miles west of Florence, on both banks of the River Arno. The city is surrounded by walls and ditches and is defended by a citadel, the fortified circuit having a length of nearly six miles, much of the space enclosed being unoccupied. The river is lined by handsome quays on both sides, the streets are spacious and well paved, and the houses are remarkable for the profusion with which marble has been employed in their construction. In the northwest part of the city is the famous Piazza del Duomo, which contains a remarkable group of buildings, consisting of the magnificent cathedral, which dates from the eleventh century, the baptistry; the Campo Santo, or cemetery, and the famous Leaning Tower (see PISA, LEANING TOWER OF).

The city is the site of a university, founded in the fifteenth century, and an academy of fine arts, founded by Napoleon. There are also many valuable art treasures. Among other interesting buildings is the house where Galileo was born. Pisa is an important center for the manufacture of cotton goods, and it has a thriving trade in oil and marble. Population in 1931, 73,041 (including suburbs).

PISA, COUNCIL OF, a general council of the Roman Catholic Church, held to consider the pretensions of the rival popes of Avignon and of Rome, opened March 25, 1409. The rival popes, Benedict XIII (of Avignon) and Gregory XII (of Rome), were summoned to appear within a stated period, but refused to comply. After mature deliberation both popes were formally deposed, and Cardinal Pietro Philargi, archbishop of Milan, was elected. The authority of the council was not, however, generally recognized, and it was not until 1417 that the schism was said to have terminated.

PISA, LEANING TOWER OF, a celebrated leaning bell tower in the town of Pisa, Italy. It was built between 1174 and 1350, of marble, in the Romanesque style of architecture. It is 179 feet high and slants about fourteen feet from the perpendicular. There are eight stories, each of which is encircled outside with arches. An inner stair leads to the bell tower at the top, in a series of tortuous windings.

PISCES, *pis'seers* (the fishes), the twelfth sign of the zodiac, into which the sun enters about Feb. 19. The constellation contains some interesting double stars. The symbol of Pisces is ♓.

PIS'CIOULTURE. See FISH AND FISH-ERIES.

PISISTRATUS (612-527 B.C.), a tyrant of Athens. By putting himself forward as the patron and benefactor of the poor and by advocating civil equality and a democratic constitution, he was able to seize upon the Acropolis in 560 B.C., and thus to make himself master, or, as the Greeks termed it, tyrant, of the city. But though a tyrant in the Greek sense, his use of power was by no means tyrannical. He upheld the wise laws of Solon and extended their authority. He was banished twice from Athens, but in 540 B.C. he was reinstated. On his death he entrusted the government to his two sons, Hippias and Hipparchus. Pisistratus erected splendid public buildings at Athens, established a public library, collected and arranged the poems of Homer, and conducted affairs with such prudence and clemency that his country enjoyed during his term of office a period of extraordinary prosperity.

PISTACHIO, *pis'tah'shi-o*, a small tree native to Persia and Syria, which is cultivated throughout Northern Africa and Southern Europe. It produces a dry fruit somewhat like an olive, the stones of which contain a finely flavored green kernel. This kernel is much used in flavoring candies, ices and other culinary dainties. Besides this tree, the genus *pistacia* includes the *turpentine tree*, which yields a liquid resembling turpentine, the *batoum tree*, of Northern Africa, from which a gum resin is obtained, and the *pistacia oleosa*, a tree of Cochinchina, the kernels of which produce a fragrant oil, used in perfuming ointments.

PISTOL. See REVOLVER.

PITCH. See TAR.

PITCH-BLENDE, a massive ore of uranium, in which the wonderful substance radium was discovered. It was for a long time the only known source of radium supply. It was first mined in Bohemia, later, deposits were discovered in Sweden, Wales, Cornwall and Colorado. The mineral is black or brown and has a luster like pitch. See RADIUM.

PITCHER PLANTS, a family of plants that are so named because the margins of

their leaves grow together in such a way as to form the leaves into pitcherlike receptacles which become filled with rain water. At the mouth of the pitcher there are glands which secrete a honeylike substance that attracts insects. The mouth is also studded with stiff, sharp-pointed hairs that project downward. When the insect enters the pitcher it cannot get out, and is drowned. The nutritive portions of the insects are absorbed by the plant and form a part of its food. The *sarracenia*, found in swamps east of the Rocky Mountains, is the best known species. The flower is globular and of a dark reddish-purple with a straw-colored center.



SARRACENIA

PITMAN, the family name of two English brothers, who achieved distinction as inventors of the shorthand systems which bear their name.

Sir Isaac Pitman, (1813-1897), inventor of the Pitman system of phonography, was born in Trowbridge, England, and was educated at London. After the publication of his *Stenographic Soundhand*, in 1837, he devoted himself entirely to the promotion of shorthand study. He founded the *Phonetic Journal*, and edited it for over fifty years. He was an ardent advocate of spelling reform, and was instrumental in introducing postage stamps into England. In 1894 he was knighted for his service in the promotion of shorthand writing. His system is favored above others in England.

Benn Pitman, (1822-1910), British-American author of phonographic works and a wood carver, was born in Trowbridge, England. He adopted his older brother Isaac's shorthand system with notable variations, for the use of the American public. He founded the Phonographic Institute in Cincinnati, O., in 1853, and invented an electro process of relief engraving. He introduced what is known as the Pitman school of wood carving, which provides for the treatment of naturalistic designs with beautiful effects. He is author of a *Life of Sir Isaac Pitman*. See **SHORTHAND**.

PITT, WILLIAM, First Earl of Chatham (1708-1778), one of the most illustrious statesmen of Great Britain. He was educated at Eton and Oxford, entered Parliament in 1735 and soon attracted notice as a powerful opponent of Robert Walpole. Pitt came into his first office, that of Vice-Treasurer of Ireland, in 1746, and later in the same year, on becoming Paymaster-General, greatly increased his popularity with the people by declining the traditional perquisites of that office. In 1746 he became Secretary of State and the real head of the government. He was dismissed in 1755, on account of his opposition to the Ministry's policy, but no stable administration could be formed without him, and he returned to power the same year and became Secretary of State and leader of the House of Commons, which made him virtually head of the government. It was under this administration and entirely under the inspiration of Pitt that Great Britain rose to a place among the nations which it had not before occupied. He supported the ambitious designs of Wolfe in Canada and of Clive in India, and curbed the rival power of France in Europe by aiding Frederick the Great.



WILLIAM PITT

The accession of George III brought Lord Bute into power, and Pitt, disagreeing with Bute, resigned in 1761. In 1766 he strongly advocated conciliatory measures toward the American colonies and undertook to form an administration, in the same year entering the House of Lords as earl of Chatham. But his Ministry was not successful, and in 1768 he resigned. Pitt was one of the greatest War Ministers England ever had, and he was a friend of the people and of the American colonies. He was buried in Westminster Abbey, where a monument was erected to his memory.

PITT, WILLIAM (1759-1806), second son of the above and one of the greatest of England's Prime Ministers. He was educated at Cambridge, was admitted to the bar in 1780 and entered Parliament the following year, at the age of twenty-one. Two years later

he was Chancellor of the Exchequer and at the age of twenty-five he became Prime Minister. Devoting his attention to the economic problems of the country, he abolished many useless offices, improved the loan system and created a sinking fund to reduce the national debt.

In 1793 war arose between Great Britain and France, a conflict which brought a heavy responsibility on Pitt, as well as immense sacrifices and burdens on his country. In 1800 the Irish union was accomplished, but in the following year the opposition of the king to all concessions to the Irish Catholics caused Pitt to resign his post. When war again broke out with France, in 1803, Pitt returned to power and exerted all his energy to render the contest successful. He found means to engage the great military powers of Russia and Austria in a new coalition, which was dissolved by the Battle of Austerlitz. This event he did not long survive.

Throughout his career Pitt maintained an aloofness toward his fellows which often provoked antagonism, but his professional integrity made him secure with Parliament and with the people. His private life was so exemplary as to be everywhere a subject of comment in his day.

PITTI PALACE, a palace in Florence, Italy, one of the most famous buildings of its kind in the world. It was begun in 1440, after plans by Brunelleschi, for the wealthy and prominent Pitti family. The first story was built then the work was suspended, and the two other stories were added in the sixteenth century. The palace is now one of the residences of the king of Italy. It contains one of the finest collections of paintings in the world, and the galleries are open to the public.

Here may be found magnificent examples of the works of Andrea del Sarto, Giorgione, Titian, Tintoretto and Raphael among Italians, and of Durer, Rembrandt, Rubens, Van Dyck and others from northern Europe.

The Medici, who bought the palace from a Pitti, began the collecting of art works, only in later generations did these various patrons of art hope to assemble perhaps the richest collection in Europe. The paintings are distributed in the halls of Venus, Apollo, and eleven other rooms. In addition there are the royal apartments and the beautiful Boboli gardens.

Here then among other treasures one may

study the "Venus and Vulcan with Cupid," the "Angelo Domi," the "Madonna of the Chair" by Raphael, the "Mars Preparing for War," the "Disputa" by del Sarto, the "Madonna of the Rose-Bush" by Botticelli and the "Temptation of St. Jerome" by Vasari. In Italy only the Vatican contains a collection that surpasses the wealth and beauty of these works.



PITTSBURGH, PA, the center of the largest district in the world in which iron and steel manufacturing is the leading industry. In the state only Philadelphia surpasses Pittsburgh in population, it ranks as tenth in the United States, with a population of 669,817 (1930 census). "The Steel City" is situated some 33 miles from the western state boundary in Allegheny County, of which it is the county seat, at the junction of the Allegheny and Monongahela rivers. It is 353 miles west of Philadelphia, 444 miles southwest of New York and 468 miles southeast of Chicago, on the Pennsylvania, the Baltimore & Ohio, the Pittsburgh & Lake Erie, and the Pittsburgh & West Virginia railroads. It has seven airports.

General Description. The city area is 54 square miles. The oldest portion is built on a flat, triangular tongue of land between the two rivers, but this land rises rapidly toward the east, where eminences attain 400 and 500 feet. The city and its suburbs reach far out along the banks of the Allegheny, Monongahela and Ohio rivers and into the tributary valleys. In the older district the streets follow the direction of the rivers and consequently tend to converge, but in the eastern and residential sections the streets are broad, well shaded and cross each other usually at right angles. Tunnels have been excavated in solid-rock hills so as to afford easy access to the residential districts, the "Liberty Tubes" are 6,280 feet long and cost over \$6,000,000.

About three miles east of the industrial center is Schenley Park, an area of 422 acres, in the midst of a residential section. Within the park are Carnegie Institute of Technology and its associated institutions, the

Museum of 2,000,000 exhibits, the Hall of Architecture, the Carnegie Library with 773,000 volumes, the Music Hall, the Phipps Conservatory and the Hall of Botany Highland Park, situated on the Allegheny in the northeastern part of the city, includes 360 acres of picturesque landscape. It is noted for its zoological gardens and for the large city reservoirs. The total park area is 1,686 acres. Schenley and Highland parks and the business district are connected by handsome boulevards. In the city and county are 850 bridges valued at \$20,000,000.

Buildings and Institutions. Other prominent buildings are the Allegheny courthouse, the postoffice, the Frick, Union Trust, Clark, Koppers, Gulf, Oliver, Chamber of Commerce and Grant buildings, the last one sustains an aerial beacon visible for 75 miles. Among the leading churches are St. Paul's and Trinity Cathedrals, the East Liberty, the First and the Third Presbyterian, the German Evangelical, the Calvary, and the B'nai Israel Synagog. At the Civic Center are the Syria Mosque, the Soldiers' and Sailors' Memorial Hall, the United States Bureau of Mines and other important institutions. Charitable foundations include many hospitals, a newsboys' home, a home for working girls, hospitals for the deaf and dumb and the blind, the Y M C A with 14 branches and the Y W C A with six branches.

Over 142,000 pupils are enrolled in 330 schools, 10,000 students engage in higher educational studies. They attend the University of Pittsburgh, the Pennsylvania College for Women, Duquesne University, Pittsburgh Musical Institute, Carnegie Institute of Technology and three Presbyterian theological seminaries.

Industry. Because it is located in the iron, coal, petroleum and natural gas regions and within favorable distance of all the leading cities of the Atlantic seaboard and of the interior of the country Pittsburgh has become one of the largest industrial centers in the United States. The value of commodities produced runs as high as \$1,764,861,100 in one year. Here are established several subsidiary plants of the United States Steel Corporation and many other large enterprises, a total of 1,370 industrial establishments. There are 350 distinct classifications in the industries of Allegheny County. The United States Department of Commerce ranks this county as fourteenth in number

of corporations, sixth in number of wage earners, fifth in total wages and fifth in value of products.

At Wilmerding, a suburb, is located the great Westinghouse Air Brake plant, and at East Pittsburgh, that of the Westinghouse Electric Company. Pittsburgh is also the headquarters of the largest firm making pickles and preserves in "57 varieties." Other important enterprises are petroleum refining, slaughtering and meat packing, printing and publishing, the manufacture of stogies (an original Pittsburgh product), and the construction of optical and surgical instruments.

History. The old town was built on the site of Fort Duquesne, erected by the French in 1754. Against this fort Braddock directed his ill-fated expedition of 1755, making his brave, but unsuccessful fight against an invincible and almost invisible foe. Three years later the fort was captured by the British, a new fort was erected and named Fort Pitt in honor of William Pitt, prime minister of England. The first permanent settlement was made in 1765. The first census (1790) listed 376 persons. The beginnings of the great glass industry were established in 1797. The first steamboat on the western rivers was launched at Pittsburgh in 1811.

Pittsburgh became the county seat in 1791 and was chartered as a city in 1816. It is governed by a mayor and a council of nine members. City affairs are controlled by nine standing committees of the council. The mayor appoints the civil service commissioners and the heads of the administrative departments. An art commission decides on all matters of civic beautification. The city planning commission has wide advisory powers.

PITTSFIELD, MASS. the county seat of Berkshire County, 50 miles northwest of Springfield, on the Boston & Albany and the New York, New Haven & Hartford railroads.

Pittsfield's manufactured products include paper-making machinery, spool silks and silk braids, electrical appliances, buttons, paper, woolen goods (the oldest industry), and ladies' hats. The General Electric Company maintains a large plant. Paper for United States bank notes and bonds is produced here.

The first settlement, known as Boston Plantation, was made in 1743. It was incorporated under its present name in 1761 and was chartered as a city in 1891. There is an airport. Population, 1930, 49,677.



"P & A Photo"

PIUS XI

Elected Pope Feb 6, 1922

PITTSTON, PA, in Luzerne County, ten miles southwest of Scranton, on the Susquehanna River and on the Lehigh Valley, the Erie, the Lackawanna, the Delaware & Hudson, the Lackawanna & Wyoming Valley and the Central of New Jersey railroads. It is in an anthracite region, and coal mining is the principal industry, more than seventy mines are in the vicinity. Fire clay is found in the vicinity, and there are foundries, machine shops, glass works, stove and engine works, brick and terra cotta plants and knitting, flour, paper and lumber mills. Pittston is chiefly a commercial and industrial city, while West Pittston, on the opposite side of the river, is more distinctly a residence place. Pittston was laid out and named in honor of William Pitt in 1770, and was chartered as a city in 1894. Population, 1920, 18,497, in 1930, 18,246.

PIUS, the name of eleven Popes, the most important of whom are the following.

PIUS II (1458-1459) was one of the most eminent scholars of his day. He studied at Siena, subsequently became secretary to Cardinal Capronici and to Antipope Felix V. Having been sent on an embassy to Emperor Frederic III, he was persuaded to accept office in the imperial court and was made ambassador, successively, to the courts of Milan, Naples and Rome. Calixtus III made him cardinal, and in 1458 he became Pope. He founded a military order of knights to defend the islands of the Aegean Sea against the Turks. But he was best known for his literary works, the most interesting of which are his letters.

PIUS V (1564-1572) was Pope from 1566 to 1572. His chief service was to enforce the reform decrees of the Council of Trent. With Spain and France, he organized the Holy League against the Turks, which resulted in the naval battle in the Gulf of Lepanto, October 7, 1571.

PIUS VI (1775-1799) held important offices under several pontiffs, and was created a cardinal by Clement XIV, whom he succeeded as Pope in 1775. To this Pope Rome is indebted for the draining of the Pontine marshes, the completion of the Church of Saint Peter and the improvement of the port of Ancona.

PIUS VII (1742-1823) was at the beginning of his clerical career a Benedictine monk. He was created bishop of Tivoli by Pius VI, and after becoming cardinal was transferred to the bishopric of Imola. His friendly attitude toward the Cisalpine Republic secured him the favor of France and the election to the Papal chair in 1800.

Napoleon, desiring to restore religion to its old status in France, had himself crowned by this Pope at Paris in 1804. However the Pope refused to recognize Joseph Bonaparte

as king of Naples, and Napoleon, in 1809, seized the States of the Church. The Pope issued a bull of excommunication against the emperor and in consequence was arrested and taken to Fontainebleau.

PIUS IX (1792-1878) was the last of the Popes to exercise temporal power, for in the course of his Papal office Italy became unified into a kingdom, and Rome became the seat of government. Pius was created a cardinal in 1840, and six years later, on the death of Gregory XVI, was elected Pope. When the revolution swept Rome in 1848 he fled, but two years later was able to return. He was strongly opposed to the unification of Italy, but after the withdrawal of the French and the establishment of the kingdom of Italy, he retired from active politics, delegating such affairs to his legates.

PIUS X (1835-1914), the successor of Pope Leo XIII, was born near Venice, the son of humble peasants. He was sent from the village school to the college at Castel Franco, then to the central seminary at Padua, where he graduated with much distinction. He was ordained priest in the Cathedral of Castel Franco on Sept. 13, 1858, and became an assistant in the parish of Tombolo. In 1867 he was transferred to Sulzano, and eight years later, was appointed canon of the cathedral of Treviso, chancellor of the diocese and spiritual director of the college. Soon he was made dean of the chapter, and after serving during an interregnum as vicar-general he was appointed suffragan by the new bishop and afterward bishop of Mantua. In 1893 Leo XIII made him a cardinal, and almost immediately afterward created him patriarch of Venice. On August 4, 1903, he was elected Pope. He took a deep interest in social questions and threw himself heart and soul into all enterprises for the bettering of the lot of the poor.

Pope Pius was beloved for his sincerity, his generosity and his sympathy with the people. He lived simply, almost frugally, and his manner was characterized by a charming and genuine courtesy. He was a man of great breadth of learning, was an eloquent and convincing speaker, a musician of considerable ability and a connoisseur in art. He died on August 20, 1914, and was succeeded by Benedict XV.

PIUS XI (1858-), before his election to the chair of Saint Peter known as Achille Ratti, was born in Italy, and passed most of his active life in Milan. In that city he was for some years in charge of the Ambrosian library, and later became librarian of the Vatican, in Rome. His greatest claim to distinction lies in his services to his Church in Poland during the World War, to which country he was sent to maintain diplomatic relations with the Holy See. Benedict XV raised him to the cardinalate June 16, 1921 in charge of the important post at Milan. His election as Pope occurred on February 6, 1922.

PIZARRO, *pe zah'-ro*, FRANCISCO (1471-1541), a Spanish adventurer, the conqueror of Peru. The spirit of adventure that swept like a wave over Spain after the discovery of the New World brought Pizarro, in 1509, to America. He settled on the Isthmus of Pana-

ma, and in 1519 formed a partnership with Diego de Almagro and Father Laque to explore the country to the south. After much suffering and hardship, realizing the necessity for better equipment, Pizarro returned to Spain. Empowered by Charles V to conquer the coveted territory, he returned in 1530, and the following year arrived at Peru to find the country divided by civil war. Pizarro treacherously seized the reigning Inca at a friendly banquet and, after extorting an immense ransom from his followers, put him to death. The whole empire was gradually conquered without much opposition. A quarrel between Pizarro and Almagro led to strife, and in 1537 Almagro was strangled by Hernando Pizarro, a brother of the general. This act was avenged by a son of Almagro, who murdered Pizarro in his palace at Lima. He was buried in Lima, which he had founded six years before his death. See ATAHUALPA; INCA.

PLAGUE, *plagg*, a contagious fever which for centuries has caused the death of thousands in various parts of the world. It is caused by a bacillus which has been recognized and found growing in rats and other small animals. These doubtless carry the infection from house to house (see GERM THEORY OF DISEASE). The plague attacks suddenly and is sometimes fatal within a few hours, but usually runs its course in three days. As characteristic of the disease, livid spots and large carbuncles sometimes appear on the skin and give to the disease the name of *bubonic plague*. There is no specific remedy, though many treatments have been adopted. Prevention by proper sanitary measures is the greatest safeguard, and is the most rigidly followed.

The first recorded visitation of the plague to Europe is that at Athens (430 B. C.), described by Thucydides. Josephus records that of Jerusalem, in A. D. 72. Among the most disastrous plagues of antiquity are those of Rome in 262, with its daily toll of 5,000 persons, and Constantinople, in 544. In the thirteenth century the plague was brought to modern Europe by the Crusaders, and from 1347 to 1350 it traversed all Europe and was then called the *black death*. In 1593 it was carried to England by an army returning from the Continent. Between 1603 and 1665, over 153,849 succumbed in London alone, the plague in Marseilles, in 1720, caused the death of over 60,000 in seven months; in 1771,

it swept off nearly the entire population of Moscow.

In 1899, the plague appeared in New York City and in San Francisco, but there was no extensive spread of the disease. In the same year in the Philippine Islands a number of lives were lost. Physicians contend that the disease can be controlled if public authorities will take sufficiently active measures.

PLAIN, a broad expanse of level or slightly undulating land, with an altitude not exceeding 1,000 feet. The Great Central Plain of North America, extending from the Appalachians to the Rocky Mountains, has a variety of surface, and in its western part gradually rises to an elevation of 2,000 or more feet, forming the plateau on which the Rocky Mountains rest. The merging of the plain into the plateau is so gradual that there is no visible line of separation between them. Most of this plain in the United States is treeless, but in Canada portions of it are heavily forested. The largest plain in the world is that of Eurasia, which comprises nearly all of Russia and Siberia. This plain is on one side of the continent, while the Great Central Plain of America is in the interior.

In the course of centuries the waves and tides have formed broad plains along the sea shore, by washing up the sand and soil on the ocean's bed. Such plains are called *coastal plains*, the Atlantic coastal plain of the United States is a good example. *Alluvial plains* are often formed at the mouth of rivers, by the deposit of silt, which the stream brings down. These plains are often called *deltas* (see DELTA). The deltas of the Nile and of the Mississippi are good examples. Inland plains are usually the former beds of the ocean or of ancient lakes, an example is the valley of the Red River of the North, which is the bed of the ancient Lake Agassiz.

PLANE, a term used to define the simplest of geometrical surfaces—a surface such that if any two points in it were joined by a straight line, that line would lie wholly within the surface. If two planes intersect, the line of intersection is a straight line. A plane is determined by three points not in a straight line, by two intersecting straight lines, by a straight line and a point outside of it or by two parallel lines. A plane figure is a portion of a plane bounded by lines, either straight or curved; in the former case the figure is rectilinear, in the later, it is curvilinear. See ARITHMETIC.

